United States Court of Appeals
for the
District of Columbia Circuit

TRANSCRIPT OF RECORD

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United States Court of Appeals for the District of Columbia

69

APRIL TERM, 1940.

No. 7750

RICHARD L. CAWOOD, APPELLANT,

vs.

CONWAY P. COE, COMMISSIONER OF PATENTS.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA.

FILED AUGUST 21, 1940

PRINTED NOVEMBER 7, 1940

United States Court of Appeals for the District of Columbia

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United States Court of Appeals for the District of Columbia

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a. District Court of the United States for the District of Columbia

Civil Action No. 1781

RICHARD L. CAWOOD, *Plaintiff*

vs.

CONWAY P. COE, Commissioner of Patents, *Defendant*

UNITED STATES OF AMERICA,
District of Columbia, ss:

BE IT REMEMBERED, that in the District Court of the United States for the District of Columbia, at the City of Washington, in said District, at the times hereinafter mentioned, the following papers were filed and proceedings had, in the above-entitled cause, to wit:

1 Complaint for Issuance of Letters Patent

Filed February 20 1939

In the District Court of the United States for the District of Columbia

Civil Action No. 1781

RICHARD L. CAWOOD, 1250 St. George St., East Liverpool, Ohio, *Plaintiff*

vs.

CONWAY P. COE, COMMISSIONER OF PATENTS, U. S. Patent Office Washington, D. C. *Defendant*

The complaint of Richard L. Cawood states:

1. That plaintiff is a citizen of the United States and a resident of East Liverpool, County of Columbiana, and State of Ohio, and sues herein in accordance with the provisions of Section 4915, Revised Statutes of the United

States, as amended, (U. S. Code, Title 35, Chapter 2, Section 63); that the defendant is sued as the United States Commissioner of Patents.

2. That the plaintiff, prior to March 5, 1936, was the true, original, first and sole inventor of a certain new and useful improvement in Ball Mills, not known or used by others in this country, nor patented nor described in any printed publication in this or any foreign country before his invention or discovery thereof, or more than two years prior to his application in this country for Letters Patent therefor; not in public use or on sale in this country for more than two years prior to his application for patent,
not abandoned, and not patented in any foreign
2 country on an application filed by him or his legal
representatives more than twelve months prior to
his said application for patent therefor in this country.

3. That the Plaintiff on or about the 5th day of March, 1936, filed in the United States Patent Office an application in writing for Letters Patent of the United States, for said new and useful improvement in Ball Mills; that said application did in all respects fully comply with the Statutes of the United States, and with the Rules of Practice of the United States Patent Office in such cases made and provided; and that such application became known and designated by Serial No. 67,353, and in that application the invention is fully and completely and concisely described and illustrated in the drawings which accompany the specification; that the plaintiff is, and has at all times been, the owner of this application.

4. That the Cawood application, Serial No. 67,353, contained the following claims to the invention, to all of which claims plaintiff believes himself to be entitled:

1. An improved ball mill which includes a cylindrical shell having stream-lined enlargements located at intervals and extending throughout the length of the inner wall of the mill, said enlargements being convex with relatively long-radius curves joining the sides thereof with the wall of the shell.

2. An improved ball mill which includes a cylindrical shell having stream-lined enlargements located at intervals and extending throughout the length of the inner wall of

the mill, these enlargements preferably formed integral with the wall of the shell, said enlargements being convex with relatively long-radius curves joining the sides thereof with the wall of the shell.

3. An improved ball mill which includes a cylindrical shell having stream-lined enlargements located at intervals
and extending throughout the length of the inner
3 wall of the mill, these enlargements arranged par-
allel with one another, said enlargements being convex with relatively long-radius curves joining the sides thereof with the wall of the shell.

4. A ball mill including a shell having stream-lined enlargements preferably formed integral with the inner wall and parallel with the axis of the mill, these enlargements being in the form of a generally continuous more or less compound curve throughout the transverse area, said enlargements being joined to the inner wall of the shell by curves, each having a transverse radius approximately equal the transverse radius of the inner portion of the enlargement.

5. A ball mill comprising a shell having ribs on the inner wall thereof, each rib in cross-section having a convex inner surface joined to the inner wall of the shell by concave surfaces, the radius of each concave surface being at least as long as the radius of the convex surface.

6. A ball mill comprising a shell having ribs on the inner wall thereof, each rib in cross-section having a convex inner surface joined to the inner wall of the shell by concave surfaces, the radius of each concave surface being greater than the radius of the convex surface.

7. A ball mill comprising a shell having integral ribs formed on the inner wall thereof and extending parallel with the axis of the shell, each of said ribs having a convex inner surface joined to the inner wall of the shell by concave surfaces, the radius of each concave surface in cross-section being appreciably greater than the radius of the convex surface.

8. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said shell having integral steamlined enlargements extending lengthwise of the inner wall of the shell and located at suitable

distances apart, these enlargements in cross-section approximately in the arc of a circle at their apexes, with their sides gradually and approximately uniformly sloping and curving in opposite directions from the curvature of the apex and merging into the wall of the shell in the general form of a compound curve from apex to shell whereby the balls roll over and follow the wall of the shell and surfaces of the enlargements, first up on one side, and then down on the other in cascades without jumping and leaping thereover, creating the smooth, rubbing action essential to proper dispersion of pigments or other material in oils or other vehicles.

4 9. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said shell having integral stream-lined enlargements extending length-wise of the inner wall of the shell and located at suitable distances apart, the apexes of these enlargements convex, and the opposite sides thereof concave in cross-section and of such profile as to create and insure the cascading of the balls in continuous contact in transit up one side, over the top, and down the other side of the enlargements without jumping or leaping.

10. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said shell having integral stream-lined enlargements extending length-wise of the inner wall of the shell and located at suitable distances apart, these enlargements in cross-section approximately in the arc of a circle at their apexes, with their sides gradually and approximately uniformly sloping and curving in opposite directions from the curvature of the apex, and merging into the wall of the shell in the general form of a compound curve from the apex to the shell to cause the balls to roll smoothly up one side, over the top, and cascade down the opposite side to the surface of the shell without leaping or jumping, resulting in a smooth rubbing action on the material treated within the shell.

5. That, thereafter, in accordance with the statutes of the United States and the Rules of Practice of the United States Patent Office in such cases made and provided, the said application, Serial No. 67,353, was duly examined by the Examiner in the Patent Office to whose Division the

application was assigned, and directed to do so by the Commissioner of Patents, and the said Examiner on or about July 13, 1937, a second time and finally rejected the foregoing claims of said application on references and for reasons fully set forth in Exhibit "A" attached hereto.

6. That, thereafter, on or about the 13th day of January, 1938, plaintiff pursuant to the statutes of the United States and Rules of Practice of the United States Patent Office in such cases made and provided, appealed to the Board of Appeals of the United States Patent Office all of the hereinbefore recited claims, which appeal came on to be heard, and on or about October 20, 1938, the said Board of Appeals rendered a judgment affirming the rejection of said claims by the Examiner, and a patent for said invention as specified in said claims was erroneously refused to the plaintiff, as shown by the opinion of said Board of Appeals, a copy of which is attached hereto marked Exhibit "B".

7. That the Commissioner of Patents has, since the said judgment of the Board of Appeals, refused and still refuses to grant Letters Patent for the invention specified in the aforesaid claims of this application of Richard L. Cawood, Serial No. 67,353, and/or on the invention set forth in the Cawood application and claims.

8. Plaintiff submits that the Examiner, the Board of Appeals and the Commissioner of Patents have acted erroneously and contrary to law and the evidence in rejecting the aforesaid claims of the said application Serial No. 67,353 on the references and for the reasons set forth in the final rejection of the Examiner and the opinion of the Board of Appeals, in failing to allow such claims, or any of them.

Wherefore, plaintiff demands:

1. That process issue herein commanding the defendant to appear and answer this Complaint, but not under oath (answer under oath being expressly waived), and to abide by and perform such orders and judgments as may be made.

2. That this Court adjudge the plaintiff herein entitled according to law to receive a patent as the Court may deem proper for the said invention as specified in the aforesaid claims, or any part thereof.

6 3. That the Commissioner of Patents be directed to issue Letters Patent to the plaintiff, Richard L. Cawood, for the said invention as specified in the aforementioned claims and/or any other claims as upon hearing the Court shall deem adequate to properly protect the invention.

4. And for such other and further relief as to the Court seems proper.

RICHARD L. CAWOOD.

HODGES and HODGES
By VERNON E. HODGES
By H. HAMLIN HODGES
Attorneys for Plaintiff

STATE OF OHIO,
County of Columbiana, ss:

Richard L. Cawood, being first duly sworn according to law, deposes and says that he has read the aforegoing Complaint by him subscribed and verily believes the statements therein made to be true.

RICHARD L. CAWOOD

Subscribed and sworn to before me, this 16th day of February, 1939.

J. E. DOHERTY
Notary Public.
Columbiana County, Ohio

My Commission Expires Jan. 28, 1942
(Notarial Seal)

7 *Exhibit "A"*

Filed February 20 1939

Div 25 Room 5709 WCM/c
Address only
"The Commissioner of Patents,
Washington, D. C.,"
and not any official by name

Paper No. 7
All communications respecting this application should give the serial number, date of filing, and name of the applicant

Department of Commerce

United States Patent Office

Washington

Mailed Jul. 13, 1937

Please find below a communication from the Examiner in charge of this application.

CONWAY P. COE
Commissioner of Patents

VERNON E. HODGES &
H. HAMLIN HODGES
1101 Earle Building
Washington, D. C.

Applicant: Richard L. Cawood
Ser. No. 67,353
Filed March 5, 1936
For Ball Mills

In response to the amendment of April 26, 1937.

Claims 1, 2 and 3 are rejected as not defining patentably from Everett. The curves joining the side walls meet the requirements of the claims.

Claims 1, 3 and 4 are rejected as directly readable on Jensen. All curves of Jensen meet the requirements of the claims.

Claim 2 is rejected on Jensen in view of Everett. No invention is involved in forming the enlargements integral with the shell as shown by Everett.

Claims 4, 5 to 10 are rejected on Everett in view of Jensen. To flatten out the curvature at the sides of 17 of Everett is not invention in view of curves 14 and 15 of Jensen.

8 Claims 5, 6 and 7 are rejected as substantially met by Jensen. The reasons of reference apply.

This action is made final.

Examiner

Exhibit "B"

Filed February 20 1939

U. S. Patent Office

Board of Appeals

Oct 20 1938

Mailed

Appeal No. 25,555 VFM
Hearing:
October 17, 1938

In the United States Patent Office

Before the Board of Appeals

Ex parte Richard L. Cawood

Application for Patent filed March 5, 1936, Serial No. 67,353. Ball Mills.

Messrs. Vernon E. Hodges & H. Hamlin Hodges for applicant.

This is an appeal from the final rejection of all the claims in the application, namely, 1 to 10.

Claim 4 is illustrative.

4. A ball mill including a shell having stream-lined enlargements preferably formed integral with the inner wall and parallel with the axis of the mill, these enlargements being in the form of a generally continuous more or less compound curve throughout the transverse area, said enlargements being joined to the inner wall of the shell by curves, each having a transverse radius approximately

9 equal the transverse radius of the inner portion of the enlargement.

The references relied upon by the examiner are as follows:

Everitt & Co. (Brit.)	105,614	Apr. 19, 1917
Jensen	1,291,008	Jan. 14, 1919

The subject matter of the claims on appeal is a ball mill provided on the interior surface with a plurality of ridge-like members designated stream-lined enlargements in the claims. These elevations extend parallel with the axis of the mill. Each has a rounded top and sides formed by shallow or gentle curves to merge with the walls of the shell between the ridges. It is emphasized that the dimensions and proportions as to shape of the ridges are such that the balls will roll smoothly up one side and over the top and down the other side without leaving the surface.

The state of the art discloses that the basic principle of applicant's apparatus has been recognized, that is, to provide longitudinal ridges in grinding mills to reduce the tendency of the charge to bodily slide as a mass in the mill. Jensen sets forth this purpose and discloses a plurality of longitudinal ridges having rounded tops and of very gentle or shallow curved adjoining surfaces. The dimensions shown by Jensen appear to be fully equivalent to those particularly set forth in applicant's case. It is our opinion that the constant contact of the balls or rollers with the surface of the mill would be as true of Jensen as of applicant's construction so that the results included in claims 4, 8, 9 and 10 are accomplished alike in both cases.

The patent to Everitt discloses a similar structure with like rounded ridges or enlargements, the sides of
10 which merge with the wall of the cylinder by reverse curves. While it seems that the reverse curves of Everitt's mill are somewhat sharper than the relatively flat or gentle curves in applicant's mill, still it is not believed that the terms of the claims define thereover. However, Everitt discloses a structure in which the ridges are formed integrally with the shell rather than of separate curved sheets as in Jensen.

It is stated in the brief that claims 4, 8, 9 and 10 best represent the invention. Of these claims, claim 4 sets forth to a certain extent the structure in terms of elements and degree of curvature. It is found that the terms of this claim may be read upon each of Jensen and Everitt. In such case where Jensen discloses fully the function and object to be obtained by so proportioning the curvature of the surfaces and where Everitt discloses integral ridges, it is our view that invention is not involved.

Claims 8, 9 and 10 define the mill in relatively broad terms as to curvature followed or modified by a "whereby" clause. The structure so far as defined in these claims is believed fully anticipated by Jensen and the limitation that forming the ridges integrally with the shell is believed without patentable merit in view of Everitt as in claim 4. So far as the action of the mill is involved, we find no difference in the integral structure over the lined structure of Jensen. This is believed to be merely a question of choice in the manufacture of the apparatus rather than any difference in function thereover.

From the brief it is understood that the appeal as to claims 1, 2, 3, 5, 6 and 7 is no longer prosecuted before us.

11 Claim 11 is referred to in the brief but this claim was not entered and not considered in the examiner's answer and is accordingly not formally on appeal.

Some evidence in the form of testimonial letters in regard to the commercial success of applicant's mill have been submitted but we do not find these necessarily relevant to the question of patentability over the state of the art. Commercial success of the mill may depend at least in part upon other important factors other than the mere shape of the ridges such as the fact that the shell and ridges may be of special or particularly hard alloy. There is no showing and so far as can be observed, no reason to assume that the mill of Everitt and Company if made of equally suitable material would not function with results comparable to those indicated in the letters. We consider it is within the rights of the public to give the interior formation of Everitt's integral ridges the same as that shown for Jensen's ridges particularly since Jensen discloses fully the theory of action of this type of ridge.

The decision of the examiner is affirmed.

EUGENE LANDERS
Examiner-in-Chief

W. L. REDROW
Examiner-in-Chief

W. L. THURBER
Examiner-in-Chief

Board of Appeals

October 20, 1938
Messrs. Vernon E. Hodges &
H. Hamlin Hodges,
1101 Earle Bldg.,
Washington, D. C.

---

12 *Answer to the Complaint.*

Filed March 8 1939

* * *

To the Honorable the Justices of the District Court of the United States for the District of Columbia.

1. Defendant admits the allegation of jurisdiction under Section 4915 R. S. (U. S. C., title 35, sec. 63.)

2. He admits that the plaintiff, claiming to be the original, first and sole inventor of an improvement in Ball Mills, made, in an application for patent thereon, averments corresponding to the allegations of paragraph 2, but denies that these allegations are sufficient to justify the issuance to plaintiff of a patent containing claims 1 to 10, inclusive, as set out in paragraph 4.

3. He admits that plaintiff filed said application on March 5, 1936, and that the said application was given Serial No. 67,353.

4. He admits that claims 1 to 10, inclusive, were presented in said application but denies that plaintiff is entitled to a patent containing the said claims.

5. He admits that said claims were finally rejected by the primary examiner.

6. He admits that the Board of Appeals of the Patent Office affirmed the decision of the primary examiner but denies that that affirmance was erroneous, since the said claims are deemed to be unpatentable over the following prior art and for the reasons given in the statement of the examiner in answer to the appeal and the decision
13 of the Board of Appeals, copies of which will be furnished at the trial:

Jensen	1,291,008,	Jan. 14, 1919,
Everitt & Co., British,	105,614,	Apr. 19, 1917.

Profert of copies of these patents is hereby made.

7. He admits that he has refused and still refuses to grant to plaintiff a patent containing said claims.

8. He denies that the actions of the Patent Office in rejecting said claims and refusing plaintiff a patent containing the said claims was either erroneous or contrary to the law and the evidence.

R. F. WHITEHEAD
Solicitor for the Patent Office,
Attorney for Defendant.

Memorandum Opinion

Filed June 10 1940

* * *

I agree with the Board of Appeals of the Patent Office in holding that there is no invention in the plaintiff's claim in view of the Jensen patent.

The complaint should be dismissed with costs.

BAILEY,
J

Findings of Fact.

Filed June 26 1940

* * *

1. This is a suit brought under the provisions of Section 4915, R. S. (U. S. C., title 35, sec. 63), in which it was

sought to have the Court find that the plaintiff,
14 Richard L. Cawood, is entitled to the issuance of a
patent on his application Serial No. 67,353, relating to Ball Mills and containing claims, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10.

2. At the trial claims 1, 2, 3, 5, 6, and 7 were withdrawn by plaintiff as part of the cause of action.

3. The Cawood application in suit discloses a ball mill wherein a steel drum has, spaced around its inner periphery, enlargements or ribs serving to lift the balls to prevent them from sliding on the inner surface of the drum. The ribs are curved in coss-section and are joined to the surface of the drum by relatively long reverse curves.

4. The British patent to Everitt & Co., No. 105,614, discloses a ball mill wherein the cylindrical drum has ribs disposed upon its inner periphery and integral therewith. These ribs are curved in cross-section and join the surface of the drum by a reverse curve.

5. The patent to Jenson, No. 1,291,008, discloses a ball mill wherein a cylindrical drum has an inner lining fastened thereto by means of bolts. The lining is wave-shaped in form having ribs curved in cross-section and meeting the surface of the drum in very long flat reverse curves.

Conclusions of Law.

1. Claims 4, 8, 9 and 10 in suit are unpatentable in view of the patent to Jenson, No. 1,291,008. No invention is involved in making the lining carrying the ribs integral with the surface of the drum. Moreover the British
15 patent to Everett & Co., 105,614, teaches that the
ribs may be made integral with the mill drum.

2. Plaintiff is not entitled to a patent containing any of the claims 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 of the Cawood application.

3. The complaint should be dismissed.

JENNINGS BAILEY
Justice.

Judgment.

Filed June 26 1940

* * *

This cause having come on to be heard and having been tried in open court and argued by counsel for the respective parties upon the pleadings and proofs adduced and submitted to the Court,

It is Adjudged this 26th day of June, 1940, that the complaint in this case be, and the same hereby is dismissed with costs against the plaintiff.

JENNINGS BAILEY
Justice.

Approved as to Form:

HODGES & HODGES
Attorneys for Plaintiff.

16

Notice of Appeal

Filed July 15 1940

* * *

Notice is hereby given this 15th day of July, 1940, that Richard L. Cawood, of East Liverpool, County of Columbiana, and State of Ohio, the plaintiff above-named, hereby appeals to the United States Court of Appeals for the District of Columbia from the judgment of this Court entered on the 26th day of June, 1940, in favor of the Hon. Commissioner of Patents, the defendant herein, against the said Richard L. Cawood.

HODGES AND HODGES
Attorneys for Plaintiff

Memorandum

July 23 - 1940

Cost Bond ($250.00) on appeal filed.

17 *Transcript of Proceedings*

Filed August 14 1940

* * *

Washington, D. C.,
Wednesday, May 22, 1940.

The above-entitled cause came on for trial before Associate Justice Jennings Bailey in Civil Division No. 5 at 11 o'clock a. m.

Appearances:

On behalf of plaintiff:
Vernon E. Hodges,
H. Hamlin Hodges.

On behalf of defendant:

H. S. Mackey.

Proceedings

The Assistant Clerk. Are counsel ready in the case of Cawood vs. Coe?

Mr. Vernon E. Hodges. The plaintiff is ready.

Mr. Mackey. The defendant is ready.

The Court. You may proceed, gentlemen.

18 *Opening Statement in Behalf of the Plaintiff*

by Mr. Vernon E. Hodges.

Mr. Hodges. May it please your Honor, this is an appeal from the Board of Appeals of the Patent Office in the case of Richard L. Cawood on an application for a patent on what is termed a ball mill. That, you will find in the course of the testimony, is not really the best name for it, but this invention is an improvement on and an evolution of the well known ball mill which is a cylinder. It is revolved at a certain speed, according to the requirements, and originally was used largely for the treatment and reduction of ores, which were coarse and granular materials and did not require refining. The present invention is an improvement to adapt the ball mill to use in dispersing pigments for paints and inks. These have to be very fine, and as a result it is necessary to adapt the construction of the cylinder and the enlargements, which your Honor will see inside the cylinder, necessitating a rubbing action as distinguished from a pounding action. A pounding action results in erosion of the enlargements, and that results in contamination and discoloration of the pigments. In order to get the colors required in present-day paints and inks, it is necessary that the contamination be either entirely eliminated or reduced to the minimum.

There are four claims—

The Court. Pardon me just a minute. May I ask how long you expect to take in trying this case?

Mr. Hodges. Well, I thought we would perhaps need
about an hour and a half for our side. We have
19 some demonstrations we should like to make, your
Honor, which we think will clarify this thing and
which we think will interest your Honor.

The Court. I imagine, then, that you will take at least an hour and a half.

Mr. Hodges. I think so, on our side.

Mr. Mackey. Of course, your Honor, we shall not take very long.

The Court. Then, I shall take up no other case before half past one.

Excuse me for interrupting you, Mr. Hodges, but I wanted to let counsel in the other cases go. There will be no other case before half past one.

Mr. Hodges. We have urged four claims. The first, No. 4, is as follows:

"A ball mill including a shell having streamlined enlargements preferably formed integral with the inner wall and parallel with the axis of the mill, these enlargements being in the form of a generally continuous more or less compound curve throughout the transverse area, said enlargements being joined to the inner wall of the shell by curves, each having a transverse radius approximately equal the transverse radius of the inner portion of the enlargement."

Claims numbers 8, 9, and 10 are as follows:

"8. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said

shell having integral streamlined enlargements ex-
20 tending lengthwise of the inner wall of the shell and
located at suitable distances apart, these enlargements in cross-section approximately in the arc of a circle at their apexes, with their sides gradually and approximately uniformly sloping and curving in opposite directions from the curvature of the apex and merging into the wall of the shell in the general form of a compound curve from apex to shell whereby the balls roll over and follow the wall of the shell and surfaces of the enlargements, first up on one side, and then down on the other in cascades without jumping and leaping thereover, creating the smooth, rubbing action essential to proper dispersion of pigments or other material in oils or other vehicles."

The Court. Are you withdrawing the other claims?

Mr. Hodges. We are appealing claims numbers 4, 8, 9, and 10, your Honor.

The Court. The others are withdrawn?

Mr. Hodges. Yes, the others are withdrawn.

Shall I read claims numbers 9 and 10, your Honor?

The Court. Very well.

Mr. Hodges. "9. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said shell having integral streamlined enlargements extending lengthwise of the inner wall of the shell and located at suitable distances apart, the apexes of these enlargements convex, and the opposite sides thereof concave in cross-section and of such profile as to create and
insure the cascading of the balls in continuous con-
21 tact in transit up one side, over the top, and down
the other side of the enlargements without jumping or leaping.

"10. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said shell having integral streamined enlargements extending lengthwise of the inner wall of the shell and located at suitable distances apart, these enlargements in cross-section approximately in the arc of a circle at their apexes, with their sides gradually and approximately uniformly sloping and curving in opposite directions from the curvature of the apex, and merging into the wall of the shell in the general form of a compound curve from the apex to the shell to cause the balls to roll smoothly up one side, over the top, and cascade down the opposite side to the surface of the shell without leaping or jumping, resulting in a smooth rubbing action on the material treated within the shell.''

Those terms, your Honor, we shall seek to explain a little more fully by our witness, Mr. Cawood, who has been working in this art for a great many years and who has developed a ball mill for the first time adapted for the dispersion of these pigments.

The Patent Office questioned the use of the words ''streamlining of the enlargements.'' That phrase really has significance. It does not signify the ordinary vogue or use as applied in advertising automobiles, and the like, but it has a very definite meaning and is adopted in order to explain how this is done.

22 Now, in the mills which were formerly used largely for the grinding of ores, which even when they were ground were left very coarse—and that was the only known use for the ball mill—they either had a complete cylinder with no enlargements or abutments inside, or some of them had enlargements, but they were truly abutments; and the idea in the old use of the mill was that they struck with a very decided impact, then jumped over, and then struck down on the other side. They were not so constructed that the balls followed the surface of the interior of the cylinder and then over in a way without losing their contact, and all the way through the entire operation they were rubbing on and dispersing these pigments, and without any sudden jolt, jar, or jumping which resulted in abrasions and wearing off of the metal inside the cylinder on these enlargements, and the least particle of erosion from these metallic parts impairs the usefulness of the pigments. In other words, they become discolored, more or less, and contaminated. It is the object of this invention to prevent this discoloration and contamination.

Opening Statement in Behalf of the Defendant

by Mr. H. S. Mackey.

Mr. Mackey. Your Honor, we have here two references on which we are relying. We have, first, the British reference of Everitt & Company. If you look at Figure 2 in Item B in our little booklet, you will see a ball mill with integral ribs to lift the balls up and cause them to roll down.

It s true that the curve that joins the rib with the wall is a little sharper than that shown in the applicant's drawing, but not much.

If you look at the reference to Jensen, particularly
23 his Figure 1, you will see again a cross-section of a
ball mill, and in this case instead of having it integral, we have a separate lining. We have this curved liner, and we have very flat reverse curves, so we have even more of a sliding or rolling action up and down over these curves without the bumping that the plaintiff objects to than I think we would have in the plaintiff's device.

I cannot see anything over either of these references, that is, over Jensen, who shows long, flat reverse curves, when considered especially with Everitt, who shows it to make ribs integral with the wall of the mill.

Certainly we have the long, flat curves as called for in these claims, so we submit, your Honor, that there is nothing in these claims on which the patent should be allowed.

Mr. Hodges. Your Honor, we shall call Mr. Cawood.

Thereupon, **Richard L. Cawood,** the plaintiff herein, was called as a witness in his own behalf and, being first duly sworn, was examined and testified as follows:

Direct Examination

By Mr. Vernon E. Hodges:

Q. Mr. Cawood, will you please state your full name and residence? A. Richard L. Cawood, East Liverpool, Ohio.

Q. Will you state to the Court what your business is? A. I am an engineer engaged in the designing and manufacturing of machinery for the process industries,
24 and I am president of the Paterson Foundry & Ma-
chine Company, that manufactures these machines.

Q. By "these machines" do you mean ball mills? A. Yes, sir, among other machines that we produce.

Q. How extensively do you manufacture ball mills, and how long have you been in that particular branch of the business? A. Approximately 40 years.

Q. How extensively do you manufacture them? Is it a large industry? A. We are one of the largest manufacturers, perhaps the largest manufacturer, of ball mills as used for the finer types of grinding, and that constitutes a very large proportion of our business.

Q. What were ball mills originally used for? A. Ore dressing.

Q. What are they now used for? A. Ordinary ball mills are still used extensively for ore dressing and for course crushing. The types which we now manufacture are used for fine grinding and particularly for the production of printing inks, rotogravure inks, paints, lacquers, food products, cosmetics, and all fine products of that type.

Q. About how long have these ball mills been used in these latter industries? A. Since about 1922.

Q. Who first developed them for the treatment of paints and inks? A. I did.

Q. How long did it require to develop this present invention? A. Approximately 12 years.

Q. Why should it have taken so long? Will you explain to the Court what you did and what problems you had to meet? A. To do that, I should perhaps say that the fundamental development came through the use of a tumbling mill of this same type but lined, first, with Belgian silex blocks, which are pure silex blocks of the type similar to the ones we see in Belgian block pavements.

Next came porcelain blocks, or a synthetic silicate, but those blocks were laid in the mills in pieces, in the case of silex about four and a half inches by seven inches and two and a half inches thick, and in the case of porcelain about two inches wide by six inches long by two inches thick, and they were laid in cement.

The grinding media used consisted largely of either imported French pebbles or porcelain balls. The great difficulty was that the grinding time was quite long, and the abrasive action of the balls or pebbles against the silex or porcelain linings eroded both the balls and the linings, allowing this gritty material to go into the product.

I then made an effort to eliminate that and found that the first thing I must do was to eliminate the cement joints, so it naturally followed that I must abandon the use of silex or porcelain linings, which must be fastened together with a bond.

Then I came to the idea of using the ball mill, so-called, in place of the pebble mill, and I knew that it could have no joints in it, first, because the balls would erode these joints, and second because if the lining were bolted together in
any way, the unground material would lodge in those
26 sections and then became dislodged about the time
a batch was finished.

I knew also that in the grinding of liquid paint, the pigments in the vehicle would leak in back of these linings and would then come out again and destroy the color. Also, I knew it would be practically impossible to change colors.

I then developed a mill so that the shell and the heads were all one peace. The great difficult with this was that the ball slid down this smooth surface, and the balls wore flat. Also, they naturally drifted into a race or circuit around the mill, following the same path of travel, thus grooving the shell.

In order to get rid of that, we put into the mill lifter bars. That is, lifter bars were first bolted in and were later welded in. But I found that the abrading action of those balls against the bars eroded the bars and also caused considerable wear on the balls, with the metallic contamination entering the product.

In the grinding of black paints and other products where color was not so important, we did a fairly good job; but so far as grinding any of the lighter colors was concerned, or grinding food products like chocolate, or grinding typewritten ribbon inks or carbon paper coatings or lipstick or any fine product, this contamination was sufficient to ruin the product.

Then, after some eight or nine years of experimentation I finally developed the machine for which this application was filed and which is streamlined on the inside.

In order to maintain good cataracting and lengthwise movement of the balls in the mill, I developed the streamlined bulbous sections which are now an integral part of
of the shell, streamlining the bulbous sections as well
27 as the shell of the mill into the heads, so that there

were no sharp corners, no crevices left; so that all lines flowed smoothly into the others.

Thus, as the balls rotate and move freely in the mill, they rub smoothly against each other and against the mill proper, thus eliminating any cause of contamination.

Q. In the working of this process, what do you use besides the material? I mean besides the mill and the balls. What media? A. If I understand your question—

Q. (Interposing) I will make it clearer. What vehicle do you use, and how do you start? Do you start with a solid mass or a powder? A. No. It is entirely a one-step process. That is, the vehicle or vehicles together with the pigments are placed in the mill, the mill is rotated for a given length of time, and the finished product is discharged.

Q. Do you gain anything in time in the use of this mill over mills of different known constructions? A. Yes, sir. In the case of buhrstone mills, which are constructed from two flat buhrstones, one running on top of the other, and also in the case of roller mills it is necessary, first, to prepare a paste by mixing the pigments and the vehicles together. This paste is then fed to the mills and a ground paste discharged. This is later thinned to the proper consistency.

In the case of the ball mill, all the ingredients are placed inside the mill, are ground, and a semi-paste is discharged;
or this semi-paste may also be thinned somewhat, so
28 that a finished product is discharged, the entire operation being a one-step process.

Q. About how long does it take to finish a batch ordinarily? A. That depends primarily on the product desired. In the case of barn paints and highway paints and paints of a cheaper character, sometimes three to five hours are sufficient; in the case of house paints, five, perhaps, to ten hours; in the case of quick-drying enamels, under-coats, automotive finishes and industrial finishes the grinding time is somewhat longer.

Q. How do those figures compare with the treatment of former types of ball mills? A. The efficiency of all grinding is regulated entirely by two things: first, the amount of grinding surface you have presented; second, the amount of pressure applied. Thus, in the case of a buhrstone mill, if you press flat surfaces hard against each other, you will grind finer than if the surfaces are loosely applied; and if you have more surface, you grind faster.

Now, the pebble mill had a grinding media which weighed approximately one-third per cubic foot of the grinding media used in the ball mill; that is, the balls are approximately three times as much per cubic foot as the pebbles. Therefore, by the use of balls in a suitable mill we can, if we carry the same height of ball charge, grind three times as fast as we can with pebbles.

The Court. I will take a short recess at this time.

(A short recess was taken. The following then occured:)

29 By Mr. Vernon E. Hodges:

Q. Mr. Cawood, have you before you the two patents referred to by the Patent Office, the British patent to Everitt and the United States patent to Jensen? A. I have, yes.

Q. Are you familiar with them? A. I am, sir.

Q. Do you know anything about these particular mills from your own experience? A. I do.

Q. Have you made mills like them in the past? A. Exactly like them, yes, sir.

Q. Very extensively? A. Yes, sir.

Q. Are they used today in certain fields? A. Yes, sir.

Q. But are they used at all in treating pigments for paints and inks? A. The Jensen mill is not; the mill similar to Everitt's is.

Q. Is it used extensively? A. No, sir.

Q. Will you explain to the Court wherein your invention differs from those two patents? Take them one at a time and point out any disadvantages in them that you have discovered from actual experience and the advantages and superiority of your particular mill as set forth in this application.

While you do that, I think it would be of interest 30 to the Court to see any demonstrations, models, drawings, or photographs that you may have. You may use them in answering this question, if it is agreeable to Mr. Justice Bailey. A. If I may be permitted to refer to the Jensen patent first, it consists of a section or of a series of sections of lining bolted or otherwise held in place against the shaft, which construction in itself makes it impractical—I might even say impossible—to use in the grinding of paints, or anything of that nature; first, on account of the erosion at the joints; second, because the liquids or vehicles carrying the pigments would seep in back of the lining and would come out again either later in that batch or in another batch.

You can easily see how, if you were grinding brown in one batch and then attempted to grind blue in the next, you would have an intermingling of the colors that would utterly destroy the value of the second batch ground.

Also, at the point where these linings meet the heads there is a sharp joint which causes some trouble.

Also, in Figure 5 of the Jensen patent it will be noted that these liners are held in place with bars, and the balls would abrade these bars and erode from them sufficient metallic contamination to destroy the color and, incidentally, the value of the batch being ground.

By the Court:

Q. Would Figure 5 be the same as Figure 1? A. The
difference between Figure 1 and Figure 5 is that the wave
motion lining, while used in both, is held in place in Figure
1 by the bolt directly from the lining to the shell; in Figure
5, in which the same wave motion lining is used, the
31 lining is held in place by the dove-tailed bars. In
other words, there are two different methods of ap-
plying the same general type of lining.

Taking up next the Everitt patent, it will be noted that the Everitt patent dwells upon the fact that bars of this type increase the action of the balls within the mill, which is a very necessary thing in mills that are used for ore dressing or for coarse grinding—in other words, mills in which we depend upon impact between the balls to do the crushing of the materials—and lifter bars of the type shown raise the balls to a high point for cataracting, and we get a jumping of the balls over these bars and a great jumping action of the balls as they are raised to a high point for cataracting.

This quality, while being of importance in ore dressing and for coarse grinding, is a decided disadvantage in the so-called grinding or, more properly speaking, dispersion of paint products, and the like.

In paint products today, as well as in most materials of that kind, we really do no grinding. Primarily we do wetting. That is, we wet every single particle with the vehicle of the pigments which are already fine enough for the purpose. In other words, we thoroughly and uniformly disperse the pigments in the vehicles.

In this case we must not have high cataracting, we must not have impact, we must not have stoppage of the grinding media against the lifter bars, because the creation of jumping or of impact action means that we get contamination from the harsh contact of the balls against the lifter bars as well as from the balls themselves.

32 It will be noted in Figure 5 of the Jensen patent, and also in Figure 2 of the Everitt patent, that there is no ease or sloping approach to the lifter bars; consequently the balls hit these bars and stop, thereby abrading them. The balls are also carried to too great a height for rotating action, and impact action occurs.

If you will contrast this with the section that I have here from the mill covered by our application, you will see the difference in shape. These balls, instead of coming to that point, jumping up, and retarding others, causing a locking of several rows of balls above it, actually roll gently over this hill.

I might demonstrate that, if I may, in a little better pictorial manner by comparing the gliding of these balls over that mill to skiers gliding over this rise.

This is an interior view of the mill, showing how it is all streamlined, with no sharp corners, so that the grinding media cannot abrade it. This may perhaps enlighten you more than a sectional view, such as these patent papers portray.

There is one thing I should like to do, if I may be permitted, and that is to demonstrate the actual action that takes place.

Mr. Hodges. It is somewhat noisy, your Honor.

The Witness. I must apologize for one thing, and that is instead of using plate glass on the face of this, I used a piece of synthetic plastic, so it has a tendency to bulge and slope these edges a little bit.

You will notice that this is a streamlined projection. The
thing to watch is this lower row of balls, to see how
33 those balls glide smoothly over this (indicating) and
do not lock these balls (indicating), and also how
they do not carry these balls to a great enough height to get an impact action on the balls.

All the balls move on the outer circuits here (indicating). Even as we revolve this fast, you will notice that the balls are not carried to such a great height in cataracting that we get impact action between the balls themselves.

By Mr. Hodges:

Q. Will you turn it very slowly? A. (The witness demonstrated.)

Now, this other model is constructed exactly on the lines of the Everitt patent. You will notice by contrast what happens. These balls are locked; that is, these balls come abruptly to this point and stop (indicating).

You will notice also that they are carried to a great height in cataracting and that we get a decided impact action. When they come up here (indicating), they fall apart and strike each other instead of rubbing.

I will move it slowly, so that you can see how these balls come up abruptly against this (indicating), stop—actually stop—and lock the balls above them.

These balls are carried up here (indicating) without their moving. Instead of gliding over the streamlined section, you see how they are carried up, and the top ball falls off first.

Up until the introduction of this streamlined mill, the grinding of colors in a ball mill was absolutely unheard of. Blacks and the very darkest of browns, perhaps, or very,
very dark shades of green were in certain cases
34 ground; but lighter colors were never ground, and
it has only been since the introduction of this machine that these lighter colors have been ground in a ball mill.

I might cite the color card of the Pittsburgh Plate Glass Company. That concern is grinding its automotive colors with this mill. You can see that the very lightest of shades are ground. This is what they term their lavex, which goes clear down to the very light creams.

Q. Can you demonstrate in a rough way how fine that has to be, and will you explain to the Court how fine this material is when you start with it? Or maybe that was answered? A. I think it was.

Q. About what mesh? A. That is difficult to say, because in the case of some pigments they are of colloidal fineness; whereas in others, I should say the coarsest pigments used today are perhaps 400 mesh.

Q. About micron size? A. Yes, about micron size most of them are today.

Q. By "micron" you mean one-millionth of a meter approximately? A. When we speak of micron size, it is not necessarily one micron but finer than what we term mesh size.

By the Court:

Q. Well, "micron" has a definite meaning, does it not? A. Yes.

Mr. Hodges. I believe it is given in the dictionary, your Honor, as about a millionth of a meter.

The Witness. If you are speaking of one micron—

By Mr. Hodges:

35 Q. Yes, just one, of course. How would that compare with ordinary white flour? Can you make that comparison? A. I can't answer that, no, sir.

Q. Did you have another demonstration to make? A. I think perhaps I might say this: that in the case of very light colors the slightest contamination is most important. For instance, in very light ivories or in the light blues or in the reds or the light greens or in the light shades, the slightest contamination, which is almost indiscernible to the naked eye, makes it prohibitive for use as a good finish.

I have here quite a few samples which I would be very glad to leave for the Court to inspect at its leisure.

Q. Would you show one or two of them, and will they indicate in contrast as much as you or I could discern with the eye? A. Yes, there is a difference. The one sample marked X was ground in a mill similar to the Everitt, whereas the other sample was ground in this mill.

Q. Will you hand them up to the Court? A. The one marked X, your Honor, is the one ground in the mill by Everitt.

Q. Is there any better way of showing that? A. Yes, in taking these samples and placing a small spot over each on a piece of glass and rubbing the two together, it demonstrates quite clearly the difference in tone. X is the contaminated sample.

By the Court:

Q. Maybe one is cleaner than the other? A. In so far as
color is concerned, it is just a difference in shade.
36 Nevertheless, the metallic contamination is definitely
present in the one and is absent in the other.

By Mr. Hodges:

Q. Will you just briefly give the Court an idea of how extensively these machines are now being used? A. Briefly, I might say that approximately 500 of these machines have been sold to date.

Q. How much would they be worth? A. Considerably in excess of a million dollars. There are 405 of them in actual production today grinding paints. These 405 are distributed pretty well over the industry.

We also have quite a number in operation grinding inks —that is, rotogravure, intaglio, news inks, and colors. For instance, all of the ink used today in the Chicago Tribune, in both their rotogravure and their comic sections, is all ground in those machines.

The Intag Corporation, of Chicago, is also grinding all colors from white to black with these machines. They have 13 of them.

The Cook Paint & Varnish Company has 16. The Pittsburgh Plate Glass Company has 23 in operation. The Sherwin-Williams Company has 41 in operation and 30 more on order. I shall not tire the Court by reading a list of other users, for I do not think it is necessary.

Q. Have you taken out patents in any other countries besides the United States? A. Yes, sir, in Canada and Great Britain.

Q. I hand you certified copies of certain letters that were filed in connection with the case in prosecution in the Pat-
ent Office. Would you just very briefly bring out any
37 points there that might be of interest? It will take
only a minute or two. A. I might say that the grind-
ing of carbon paper coating and typewriter ribbon inks, on

which patents have already been allowed with this same mill, has been revolutionized since the introduction of this machine. The grinding of lipstick in these machines, on which patents have already been allowed, has been revolutionized.

Q. What about lenses? Is not talcum powder used for lenses? A. No. The first machine of this type that I ever built was for the Bausch & Lomb Company, for whom I have run a lot of experiments on the grinding of rouge for lens grinding. It took me about two years to finally get the machine so that it would grind rouge sufficiently fine and smooth for lens polishing without contamination and without iron particles in it. That was the first machine that was placed in successful operation.

Q. Do they use that on some of these lenses of astronomical size? A. Yes, they do. The 100-inch lens at the Wilson Observatory was originally scratched very badly on account of defective rouge and was later corrected by the use of a rouge that was properly ground.

Q. By your mills? A. Yes. I might say that the larger manufacturers of carbon paper coating today are using these mills almost exclusively for that purpose.

These letters, I believe, have been placed in evidence?

Q. They will be placed in evidence. I do not think
38 it is necessary for you to take the time of the Court
to go into them unless there are some other points
brought out by them.

Mr. Hodges. We have, your Honor, two other witnesses, of whom we can ask only a few questions. They are superintendents or officers of some of these concerns.

By Mr. Hodges:

Q. Have you finished, Mr. Cawood? A. I think so.

Mr. Hodges. You may examine.

Cross-Examination

By Mr. Mackey:

Q. In your device why do you use the bars at all? That is, what is the utility of using these bars—the lifter bars—or ridges? A. I think I touched upon that a little earlier in my testimony. It was this: Originally when these mills were used the balls slid very freely; there was nothing to stop their flight. As a consequence, the balls found certain paths and followed them, and in sliding they wore the side off the ball; the ball became flat.

Also, remaining in that one path, it had a tendency to channel the mill, so that the mill after two or three years use became a series of corrugations for its entire length.

Q. So, the lifter bars or the ridges are really put in there to increase the play of the balls or increase the agitation,
so that they won't keep in one path? A. No, I
39 wouldn't say that, because they don't. Perhaps I
had best answer that question this way:

In the use of ordinary square lifter bars, that is the result of the use of that bar.

Q. What about your bars? A. No, that does not increase the agitation.

Q. But it keeps the balls from sliding and wearing grooves? A. That is right.

Q. The Jensen patent in Figure 1 does not show any bars, does it? A. No, it does not.

Q. That shows a uniform wave motion of the lining? A. That is true, yes.

Q. In the machines you have sold, of what material were the mill and the balls composed? A. The earlier mills were made of ordinary open-hearth steel.

Q. What were these mills, for example, that are referred to in these letters that you will put in evidence composed of? A. I am sorry; I did not hear the question.

Q. Of what material were the mills composed that are referred to in the letters that you will put in evidence? A. In the first letters?

Q. In most of the letters. You might refer to some of the letters here. A. The dates of manufacture of those mills are not mentioned in any of those letters, so the composition of metal is different in the different mills that are mentioned here.

Q. Is it not a fact that most of these letters men-
40 tion chrome manganese mills? A. Those of later
build, yes, sir; the ones of later manufacture.

Q. That is very hard, wear-resisting material, is it not? A. Yes.

Mr. Mackey. Thank you. That is all.

(The witness left the stand.)

Thereupon, **Herbert H. Harnden** was called as a witness and, having been first duly sworn, was examined and testified as follows:

Direct Examination

By Mr. Vernon E. Hodges:

Q. Will you state your name and residence, please? A. Herbert H. Harnden, Cincinnati, Ohio.

Q. What is your occupation? A. I am general superintendent of the Ault and Wyborg Division of the Interchemical Corporation, New York City.

Q. You have been present and have heard the testimony of Mr. Cawood, have you not? A. Yes.

Q. Are you in any way interested in the outcome of this case? A. Well, only from a production angle. As production men, we are always searching for improved equipment that will expedite grinding or mixing and even straining of paints, in order to reduce our costs, and so on and so forth.

Q. I want to ask you to speak a little louder and to speak to the Court.

41 You are familiar with these mills that Mr. Cawood has talked about? A. Oh, yes, I have more or less grown up with the so-called pebble mill or conventional ball mill.

Q. Have you used any of those mills? A. Yes, we have the pebble mill, we have the silex-lined mill and the porex-lined mill, and what we call the steel ball mill.

Q. The steel ball mill, I take it, is like the mill we have been describing? A. That is right; that is correct.

Q. How many of those do you use? A. Well, various sizes. We have them from 500 pounds capacity to 5,000 pounds capacity, and I think we have something like—probably we have eight or ten of them around the plant.

Q. Have you used them for some time? A. Oh, yes, we have used them. Speaking of the steel ball mill particularly, we have had those in the plant there, some of them, for as long as six or seven years.

Q. Have these mills which Mr. Cawood has been testifying about any advantage in the art of treating pigments, and so on over others prior to them? A. Well, the old type mill, first of all, had a soft shell. The steel was not hard. The steel balls were soft. The consequence of that was that we got considerable contamination, and we were limited in the use of them to black, brown, and dark reds; we never were able to grind a light yellow, for instance, or white, or a delicate red, due to that fact.

Then, in connection with the old type mill, we al-
42 ways had to use a centrifugal, which traveled at a
speed of, oh, from six to ten thousand revolutions a minute, which is something like a milk separator, and it would throw that heavy particle out. That is the way we removed the steel.

Then, the sides of the mill were smooth, and we had to speed them up, and it used more horsepower to turn the mill over, because we had to turn it fast to get the proper cataracting of those balls.

Then they came along with the lifter bar, and that was more or less of a square bar, just bolted on the inside of the mill.

As soon as we put those lifter bars in, we found that in many instances we would split the ball; in other words, they would hit the sharp corner of the lifter bar and sometimes crack those hard balls, because they were so hard in the first place. The balls were sometimes harder than the shell.

Then they started to try and modify this bar so as to get more gentle action, and also, I believe, to make the shell itself harder, because we appreciated the value of the mill from the manufacturing cost angle; because, for instance, if we ground some product on a tandem-stone mill—just a two-stone mill, one above the other—and we did it all in one operation, that would cost us in the neighborhood of 40 to 50 cents a gallon. I am talking now of automotive products that have to be ground awfully fine.

If we took on some product and put it in one of those steel-ball mills and let it run anywhere from 24 to 32 hours, why, we got a much better product; we got a finer product;
but we could never always get as clean a product for
43 color when we got into the light shades.

Then, as I say, they developed this hard, chrome manganese shell and the balls, and we were able gradually to step the different colored pigments up to the point now where we can grind ultramarine blue, which is a rather translucent color and discolors very easily; also light, delicate yellows, and even whites that have to be probably shaded over to light ivory or light blue.

Q. Do you think the improvement is essentially in the particular material used in making the cylinder of the mill or in the enlargements or so-called lifters? A. Well, I think it is a collaboration of ideas. Of course, we work pretty close with equipment manufacturers, not only in mills but in centrifuges, and to try to work out things that might prove of mutual advantage.

For instance, we are always looking for a better clarifier; always looking for a better mill, when that will cut our grinding time. The cost of manufacturing paints is merely entirely involved around the grinding procedure; the rest of the work is more or less a case of man power with it.

If we can get the stuff ground and get it off the mill, we can usually find means through additional man power or agitators to reduce it to the proper working consistency and shade and thinning and tinting, and so on and so forth.

So, our costs are based primarily on the length of time it takes to grind the paste.

Q. Are you able to reduce that time now with greater
economy? A. Well, in connection with that, you have
44 vehicles to consider, but the general action of the
mill now does not heat up as fast as it used to be-
cause of a more smooth flowing of that steel.

When those ball mills used to run five or six years, you could hear them bang, bang, bang against the shell. Now you just hear a gentle murmur when that mill is running, which indicates that there is not much of an impact.

Another thing: We found that we didn't use—we didn't have to replace the steel balls as often. The fact of the matter is, I believe, that we have the reputation of buying less steel balls than anybody else in the manufacture of paint. Of course, that hinges on the proper consistencies of paint, grinding, and so on and so forth. But we find that contamination of our products now is very much reduced over the old method, particularly when we use the steel-lined mill.

Q. So, you are now able to make almost any color? A. Oh, yes, we are sold on the idea now that we can make any color within reason.

Mr. Hodges. That is all.

Cross-Examination

By Mr. Mackey:

Q. At least a portion of the new utility of this mill is due to the fact that it is made of very hard material, is it not? A. As I said before, I think that is a collaboration idea, but I think a lot can be attributed to the smooth flowing steel ball.

Q. Have you ever compared the soft steel mill
45 with the hard steel mill having the same configuration? A. Making a direct comparison?

Q. A direct comparison considering the difference in material. A. Yes, we can do that. We can do it by our formulations on grinding times.

Q. Have you made that comparison? A. We have standard formulations. Probably they have been going for years, and we have stepped from one type of mill to another, and we found we have been able to save in lots of cases, at least in centrifuges and the replacement of steel ball. That is where we made our saving.

Q. These steel ball mills operate faster? That is, they do not take so long to mix materials? Is that true? You save time and expense in that way? A. Oh, yes, the time. Well, the time factor is entirely in the—well, let us say the type of pigments you are trying to grind. The pigments we buy today are pretty well subdivided or broken down, in other words. Our real job is to wet this pigment, and in wetting—we call it dispersing—some people call it dispersing—to get that to a smooth, uniform paste, so that we don't have to spend too much time in the straining process to clean up the small particles that are left.

Q. I was thinking particularly of the change in time from the buhrstone mills to the pebble mills, which you spoke of. That is, you have stepped up your time with the steel ball mills? A. Oh, yes. What we like particularly—the difference between the buhrstone—I am talking about the
46 stone mills, you understand—

Q. Yes. A. (Continuing) —and the steel ball mill is that we don't have to have supervision. You have to have a man watching a tandem-stone mill all the time in order to keep the paint feeding through it properly, so that you don't burn up the product, while in the steel ball mill you put your whole charge in.

We work on a ratio of using three parts of steel ball to one part of paste we are trying to grind. We try to set this up as standard procedure. If we prescribe a formula to grind 48 hours in a steel ball mill, we can duplicate that grind identically, using the same ball ratio between the balls and the paste we are trying to grind.

Now, if we increase that charge to 4 to 1, we grind faster; if we reduce that charge to 2 to 1, we grind slower. In other words, the grinding time is entirely contingent on the number of steel balls in relation to the paste you are trying to grind.

Q. Those are all advantages that flow from the use of any steel ball mill, from the buhrstone or silex lined, pebble, or one of the others? A. Yes, that is true, from the supervision angle.

Mr. Mackey. That is all.

Redirect Examination

By Mr. Hodges:

Q. By wetting you mean getting every particle wet with the vehicle, I suppose; is that right? A. That is true. You can do this wetting procedure on a glass or a knife. You can wet it in that manner.

47 Q. Is there an advantage or is there a difference in the rubbing or pounding effect in this Cawood construction with the streamlined enlargements over the abrupt ones in that respect? A. Well, in the first place, it destroys the balls, and you get much greater abrasion that way, and you also increase the heat of the mill by that steel pounding on the other steel balls and on the shell.

Mr. Hodges. That is all.

(The witness left the stand.)

Thereupon, **David E. Eichelberger** was called as a witness in behalf of the plaintiff and, being first duly sworn, was examined and testified as follows:

Direct Examination

By Mr. Vernon E. Hodges:

Q. Will you state your name, residence, and occupation, Mr. Eichelberger, please? A. David E. Eichelberger. I reside in Detroit, Michigan. My occupation is general superintendent of the Cook Paint & Varnish Company, Detroit plant.

Q. In your company are these ball mills used in treating pigments and the like? A. Yes, sir.

Q. Extensively? A. Yes, sir, quite extensively.

Q. In just the manner Mr. Cawood described? A. Yes, sir.

Q. Have you noticed any distinction between his present construction and those constructions that may have been used in the past for the same purpose? A. Definitely so.
48

Q. In what way do they differ in results? A. We secure shorter grinding time and much less contamination. In the old mill we were not able to grind light colors. In the new mills we are able to grind any light colors up to just off white.

Q. Will you state how many of them you use? A. We have a total of 16 in our Detroit and Kansas City plants.

Q. You have plants in three different places? A. That is right; Houston, Kansas City, and Detroit.

Q. You are assistant vice-president? A. That is right.

Q. Do you find any difference in the results in the heating and wasting of material, destruction of balls, and so on? A. Yes, we do. We have had several, or I would say numerous, comparisons. We, as are all other paint manufacturers, are interested in cutting our grinding time down, which represents a large part of our cost.

We have some of the old type, with lifter bars and soft shells, and we have the new type, with hard shell and the wave-like bar.

In addition to that, just to make a comparison and satisfy ourselves—we usually take the manufacturer's word for it, not only in ball mills, centrifuges, clarifiers, pigments, et cetera, but we conduct our own tests.

In other words, they can tell us, but we have got to prove it to ourselves.

So, we took one of our old, soft shelled mills, a
49 standard four by five. We took the whole inside
shell out. We had that replaced by the hard, chrome manganese shell. In this shell we welded the hard, square lifter type bars. Then we made direct comparisons—the same, exact formulation—pigments, vehicles, mills, running right side by side, and we compared the soft shell

versus this remade with the hard steel and the square bar and the new type, and we found a definite improvement and difference between each three types.

The old soft shell took us about a third longer to grind with lots of contamination. The one in which we put the hard shell with the square bars we were able to reduce the time not quite as much, but after a year's operation these lifter bars had been hit on the corners. We still got a lot of steel, not as much, but the balls did not wear round; whereas in the new mill, with your hard shell and the wave-type bars, the balls were perfectly round. It took us less time to grind, and we had practically no steel whatsoever.

Our comparison on a batch ran about like this: On the old soft shell with the old type bars, about 72 hours, with lots of steel.

In the mill we remodeled, with hard shell and the square bars, we could grind it in about 66 hours with less steel but with entirely too much.

In the other mill, the new ball mill, we would grind in about 48 hours, and we could detect practically no steel at all, and the balls wore round, whereas in the others they wore oblong shaped.

Another advantage of the new type, wave-like bar versus
your square lifter bars, we found a great mainte-
50 nance cost; we would have to replace those bars. It
depends on how long the mill was used, but where
we were using our mills constantly, we had to replace the bars in a period of a couple of years. On the wave type there are no bars added; it is all part of the mill.

Mr. Hodges. That is all.

Cross-Examination

By Mr. Mackey:

Q. In the test of the soft steel shell and the hard type, the bars you welded in yourself were absolutely square? They were not rounded bars? A. They were about a half inch by an inch and a half by a half inch thick.

Q. With sharp corners? A. Well, the corners instead of being sharp were welded on to the edge of the bar, so that it could be as round as we could make it. That was also of hard steel. It wasn't sharp, though it wasn't a complete curve.

Mr. Mackey. That is all.

Redirect Examination

By Mr. Hodges:

Q. Maybe what you have just answered is somewhat like the Everitt patent? A. Well, under the Everitt patent—I am not familiar with it under this patent.

Q. But I mean the bars—the shape of the bars you dedescribed. A. That is right.

51 Q. Does that compare? A. That is right; quite favorably.

Mr. Hodges. That is all.

Recross-Examination

By Mr. Mackey:

Q. You had the bars rounded as much as is shown in the Everitt patent? A. Well, I would say not rounded quite as much, but they were definitely round. They were not square, hard corners.

Q. You had them rounded where you welded them in? You made the usual type of weld? A. That is right. In addition to that, we welded over these two outside edges.

Q. Would you say that the welding material was that hard too? A. Very hard; it was equally as hard as the bar itself.

Mr. Mackey. That is all.

(The witness left the stand.)

Mr. Hodges. Your Honor, I should like to offer in evidence a certified copy of the file wrapper in the Cawood application. Shall we designate it as Plaintiff's Exhibit 1?

The Court. Yes.

(Certified copy of file wrapper in application of Richard L. Cawood, Serial No. 67,353, was marked as Plaintiff's Exhibit 1 and was received in evidence.)

Mr. Hodges. I should also like to offer in evidence a certified copy of data and letters from various paint and ink manufacturers.

52 The Court. Very well.

(Certified copy of letters referred to was marked as Plaintiff's Exhibit 2 and received in evidence.)

Mr. Hodges. Those letters were all submitted to the Patent Office in the prosecution of the case. Then we have these samples, your Honor. Mr. Cawood would be glad to leave them if your Honor would like to have them.

The Court. I do not care to have them.

Mr. Hodges. Or these?

The Court. No, nor them. The drawings give that information.

Mr. Hodges. Very well. I wonder if your Honor would care to have any of these drawings and pictures?

The Court. No, I think not. I have the drawings in the patent.

Mr. Hodges. Then, that is our case.

Evidence in Behalf of the Defendant

Mr. Mackey. At this time I will offer in evidence as Defendant's Exhibit 1 the little booklet containing the prior art references, the print of drawings, and Examiner's statement, and the decision of the Board of Appeals.

The Court. It may be received.

(The booklet referred to, entitled "Richard L. Cawood vs. Coe," was marked as Defendant's Exhibit 1 and was received in evidence.)

The Court. Do you want to argue this case now or to submit it on briefs?

53 Mr. Hodges. Your Honor, I think we would rather submit it on briefs.

The Court. Is that satisfactory, Mr. Mackey?

Mr. Mackey. That is satisfactory to me. At what time would your Honor like to have the briefs in?

The Court. Well, I think I have all I can handle this week. Try to get yours in on Monday, Mr. Hodges.

Mr. Hodges. Next Monday? We will try very hard to do so.

The Court. And you will take two days after that, Mr. Mackey.

Mr. Mackey. That would be Wednesday?

The Court. Yes. Very well.

(At 12:35 o'clock p. m. the trial was concluded.)

54 *Order to Omit Duplicates of Exhibits*

Filed August 3 1940.

* * *

By consent of the parties hereto, it is on this 3rd day of August, 1940, ordered that Plaintiff's original Exhibits Nos. 1 and 2 and Defendant's Exhibit No. 1, be transmitted to the United States Court of Appeals for the District of Columbia for use in connection with the appeal in the above-entitled cause.

JAS. W. MORRIS
Justice

We consent:

VERNON E. HODGES
H. HAMLIN HODGES
Attorneys for Plaintiff

W. W. COCHRAN
Attorney for Defendant

55 *Designation of Record*

Filed July 29 1940

* * *

Now comes the Plaintiff, Richard L. Cawood, the appellant in the above-entitled cause, by his attorneys, and designates the parts of the record which he desires to have included in the transcript, said parts being considered sufficient for the determination of the questions raised on appeal, namely:

(1) Bill of Complaint
(2) Answer to the Bill of Complaint
(3) Findings of Fact
(4) Conclusions of Law
(5) Final Judgment
(6) Notice of Appeal
(7) Order fixing bond
(8) Statement of Evidence including:

I. Part of Plaintiff's Exhibit #1, being a photostatic copy of the original application and drawing filed 5th day of March, 1936, and additional amendments to specification A^1 A^2 and A^3 and claims 5, 6 and 7 filed Aug. 6, 1936;

amendments to pages 2 and 4 of the specification and claims 8, 9 and 10 filed April 26, 1937.

II. Part of Plaintiff's Exhibit #2, which includes some 19 letters, a list of purchasers and users of appellant's machines, and reproduction of one sheet having three figures illustrative of action of balls in Jensen patent and appellant's mill.

III. Defendant's Exhibit #1 comprising—
56 A. Jensen Patent No. 1,291,008
B. Everitt (British) patent No. 105,614
C. Examiner's Statement
D. Decision of Board of Appeals
(8-A) Transcript of Proceedings, dated May 22, 1940.
(9) Stipulation
(10) This Designation of Record.
(11) Order to omit duplicates of exhibits

HODGES & HODGES
Attorneys for Richard L. Cawood
Plaintiff-Appellant

Stipulation

Filed July 29 1940

* * *

It is this 27th day of July, 1940, hereby stipulated and agreed by and between the parties hereto, by their respective attorneys, that the transcript on Appeal shall constitute those parts of the original record as are set forth in the foregoing Designation of Record, to which this Stipulation is attached, service and receipt of copy of such Designation of the Record are hereby acknowledged by the Defendant.

HODGES & HODGES
Attorneys for Plaintiff-Appellant

W. W. COCHRAN
Attorney for Defendant

57 District Court of the United States
For the District of Columbia

UNITED STATES OF AMERICA,
District of Columbia, ss:

I, Charles E. Stewart, Clerk of the District Court of the United States for the District of Columbia, hereby certify the foregoing pages numbered from 1 to 56, both inclusive, (excepting the transcript of proceedings, as to the accuracy of which counsel have stipulated), to be a true and correct transcript of the record, according to directions of counsel herein filed, copy of which is made part of this transcript, and in accordance with Rule 75 (g) of the Federal Rules of Civil Procedure for the District Courts of the United States, in cause No. 1781, Civil Action, wherein Richard L. Cawood is Plaintiff and Conway P. Coe, Commissioner of Patents, is Defendant, as the same remains upon the files and of record in said Court.

In Testimony Whereof, I hereunto subscribe my name and affix the seal of said Court, at the City of Washington, in said District, this 16th day of August, 1940.

C. E. STEWART,
(Seal) *Clerk.*

61 My invention relates to an improvement in Ball Mills, the design and formation of which eliminates the use of lifter bars.

It has been customary in ball mills to employ a conventional lifter bar which has had two purposes, first, to take the wear off the lining and place it on the lifter bar, thus preventing "channeling" and excessive wear on the lining; and, second, to lift the charge of balls, which constitute the grinding media, to the proper height for cascading. These lifter bars present a sharply projecting edge which impedes free passage of the balls, and which blocks their natural tendency to roll over the lining of the mill, and, inasmuch as they do block the free passage of the balls, these bars are subject to erosion by the grinding and hammering action of the balls, and as a result contaminate the product being ground in the mill to such an extent that but few products can be ground in an ordinary unlined or metallic lined mill. It will be understood that these lifter bars are used only in mills which either have no linings of the ordinary silex, buhrstone or porcelain type or in mills where the linings are composed of steel plates, and where iron or steel balls are generally used as the grinding media.

For certain purposes, for instance, the manufacture of house and industrial paints, varnish enamels, lacquers and other paint products, and for other products as well, the unlined mills are very desirable inasmuch as, not being lined with the customary silex, buhrstone or porcelain, no grit is ground off the linings and, furthermore, steel balls being used in this type of mill as the grinding media, and weighing nearly three times as much as pebbles or porcelain balls, will grind the product far more rapidly than
62 is possible in a mill lined with buhrstone or porcelain
and in which pebbles or porcelain balls are used as the dispersing media.

A great detriment to the use of ball mills to date has been that the products ground in them are always contaminated with steel. I have made a careful study of this problem, and have satisfied myself that practically all of the iron or steel contamination comes from the use of the conventional lifter bars.

What I have really developed is a mill, the body of which is provided with enlarged integral stream-lined sections which protrude into the mill at certain intervals around the periphery of the body and extend longitudinally the full length of the mill, the entire body inside being polished, thereby offering no resistance to the free movement of the dispersing media, but lifting the same as the mill revolves to the proper height for cascading.

In other words, what I have developed is not a lifter bar at all but a mill, the body of which is built in accordance with the foregoing description. The difference between the time-honored type of mill and process and my present invention is not a mere difference in degree but a difference between success and failure in the process of dispersing expensive materials.

With the foregoing statement in view, this invention consists of an improved ball-mill, the inner wall of which is provided with stream-lined enlargements located around the inner periphery at predetermined intervals and extending throughout the length of the mill, the entire body inside

being polished, for the purpose of raising the balls to the proper height and cascading them without creating the erosion resulting from the hammering and grinding action of the balls against the sharp edges of the lifter bars as heretofore, thus preventing the contamination of the expensive materials being treated in the mill due to the pres-
ence of metallic particles, which contamination it is
63 repeated, has resulted from the grinding away and
erosion of the time-honored, conventional form of
lifting bars now in use.

In the accompanying drawings:

Fig. 1 is a cross-section through my improved ball mill; and

Fig. 2 is an enlarged fragmentary view of the limited portion of the structure shown in Fig. 1.

The numeral 1 represents the shell of the mill, and the numeral 2 indicates the stream-lined enlargements usually formed integral with the inner wall of the mill at equidistant intervals, and preferably running parallel with one another and with the axis of rotation and preferably extending throughout the entire length of the mill and in predetermined numbers determined by the size of the mill. For example, in a mill four feet in diameter, I would probably use five of these enlargements, while in a mill eight feet in diameter twelve would probably be preferable, with about eight for a six foot mill. Obviously, the number is subject to variation, as is the size. These enlargements 2 act as lifters just as the well known angular bars did, that is to say they lift the balls 3 as the mill rotates. Without some lifting means, great slippage would occur, and it would be practically impossible to raise the balls to the proper height for cascading to produce economical grinding of the material being treated in the mill.

The term "stream-lined" is employed as it will be observed the enlargements 2 in cross-section are in the form of an unbroken, more or less compound curved wall of the mill. At the apex of the enlargements the wall thickness is
two or three times the thickness of the remainder of
64 the wall of the mill, and I employ this term "stream-
lined" as a term for this particular formation at in-

tervals because of its greatly curved shape, which presents no abrupt or sharp corners at any point in its surface.

Obviously, these stream-lined portions are a great improvement over the old square-cornered bars because they do not wear away and form metallic particles to contaminate the product, but the matter goes much further than that, for the present invention makes possible the dispersing in an unlined mill or steel lined mill, of products which have heretofore been considered absolutely impossible to grind in this type of mill when the old style lifter bars were used.

The factor of metallic contamination is paramount when dealing with certain products such as house and industrial paints, varnish enamels, lacquers and other paint products, and all of the unlined or iron lined mills now in use with the customary square-cornered lifter bars in them, have (up to the present time) been more or less of a failure on account of this metallic contamination brought about by wear and erosion on the lifter bars due to the punishment resulting from the impact and the resulting wear and tear caused by the balls.

The elimination of these bars in the mill and the replacement of them with the raised sections 2, eliminates this difficulty, and thereby turns an impractical machine into a practical one, so that we have here, not a difference in degree, but a difference in design and construction and a difference in result which heretofore was never attained, and which practically makes the difference between failure and success.

65 I claim:

1. An improved ball mill which includes a cylindrical shell having stream-lined enlargements located at intervals and extending throughout the length of the inner wall of the mill.

2. An improved ball mill which includes a cylindrical shell having stream-lined enlargements located at intervals and extending throughout the length of the inner wall of the mill, these enlargements preferably formed integral with the wall of the shell.

3. An improved ball mill which includes a cylindrical shell having stream-lined enlargements located at intervals and extending throughout the length of the inner wall of the mill, these enlargements arranged parallel with one another.

4. A ball mill including a shell having stream-lined enlargements preferably formed integral with the inner wall and parallel with the axis of the mill, these enlargements being in the form of a generally continuous more or less compound curve throughout the transverse area.

67353

Print of drawing as originally filed.

Fig. 1

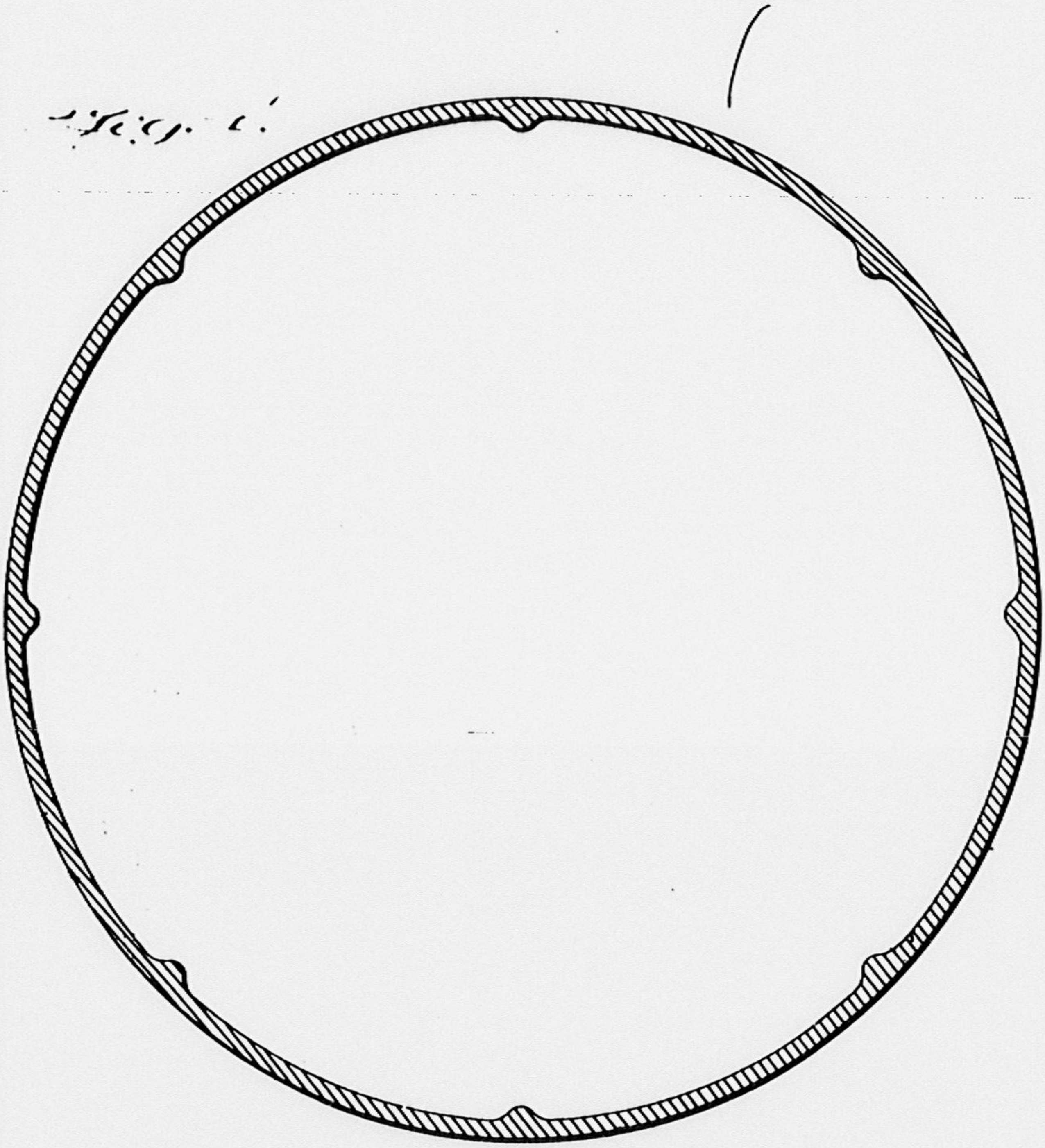
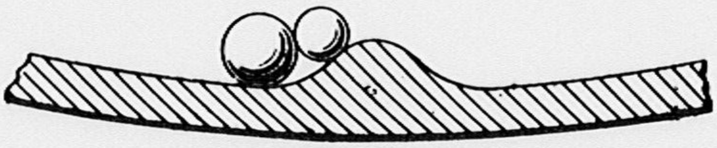


Fig. 2



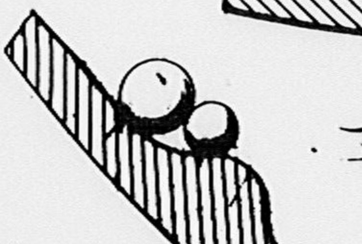


Fig. 3

Inventor

Richard L. Cawood

Vernon E. Hodges
By and H. Hamlin Hodges
his Attorneys

7 R

69 Endorsed: Patent Office Aug 8 1936 Division 25

Endorsed: Mail Division Aug 6 1936 U. S. Patent Office

In the United States Patent Office

Div. 25, Room 5709.

In re Application of Richard L. Cawood Ball Mills Filed: March 5, 1936 Serial No. 67353

Hon. Commissioner of Patents,

Sir:

Claim 1, line 3; Claim 2, line 5; and Claim 3, line 4, before the period insert:—, said enlargements being convex with relatively long-radius curves joining the sides thereof with the wall of the shell—.

Claim 4, line 3, after "enlargements" insert:—being—. Line 5, after "area" insert:—, said enlargements being joined to the inner wall of the shell by curves, each having a transverse radius approximately equal the transverse radius of the inner portion of the enlargement—.

Please add the following claims:

5. A ball mill comprising a shell having ribs on the inner wall thereof, each rib in cross-section having a convex inner surface joined to the inner wall of the shell by concave surfaces, the radius of each concave surface being at least as long as the radius of the convex surface.

70 6. A ball mill comprising a shell having ribs on the inner wall thereof, each rib in cross-section having a convex inner surface joined to the inner wall of the shell by concave surfaces, the radius of each concave surface being greater than the radius of the convex surface.

7. A ball mill comprising a shell having integral ribs formed on the inner wall thereof and extending parallel with the axis of the shell, each of said ribs having a convex inner surface joined to the inner wall of the shell by concave surfaces, the radius of each concave surface in cross-section being appreciably greater than the radius of the convex surface.

74 Endorsed: Patent Office Apr 28 1937 Division 25

Endorsed: Application Div. Apr 26 '37 U. S. Patent Office

In the United States Patent Office

Div. 25, Room 5709.

In re Application of Richard L. Cawood Ball Mills Filed: March 5, 1936 Serial No. 67353

Hon. Commissioner of Patents,

Sir:

In the specification:

Page 2, lines 2, 13 and 20, erase "grinding" and insert: —dispersing—.

Page 4, line 9, erase "grinding" and insert:—dispersing—.

Please add the following claims:

8. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said shell having integral stream-lined enlargements extending lengthwise of the inner wall of the shell and located at suitable distances apart, these enlargements in cross-section approximately in the arc of a circle at their apexes, with their sides gradually and approximately uniformly sloping and curving in opposite directions from the curvature of the apex and merging into the wall of the shell in the general form of a compound curve from apex to shell whereby the balls roll over and follow the wall of the shell and surfaces of the enlargements, first up on one side, and then down on the other in cascades without jumping and leaping thereover, creating the smooth, rubbing action essential to proper dispersion of pigments or other material in oils or other vehicles.

75 9. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said shell having integral stream-lined enlargements extending lengthwise of the inner wall of the shell and located at suitable distances apart, the apexes of these enlargements convex, and the opposite sides thereof concave in cross-section and of such profile as to create and insure

the cascading of the balls in continuous contact in transit up one side, over the top, and down the other side of the enlargements without jumping or leaping.

10. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said shell having integral stream-lined enlargements extending lengthwise of the inner wall of the shell and located at suitable distances apart, these enlargements in cross-section approximately in the arc of a circle at their apexes, with their sides gradually and approximately uniformly sloping and curving in opposite directions from the curvature of the apex, and merging into the wall of the shell in the general form of a compound curve from the apex to the shell to cause the balls to roll smoothly up one side, over the top, and cascade down the opposite side to the surface of the shell without leaping or jumping, resulting in a smooth rubbing action on the material treated within the shell.

100 The improved mill upon which Mr. Cawood seeks a patent has now been in successful use for over two years and over 300 of these mills are now in operation in plants throughout the United States manufacturing paint products of many kinds, printing inks of various types, and similar fine products where perfect dispersion of pigments in vehicles are essential.

The following list will show the names of some of the companies in whose plants one or more of these mills have been installed, some of the companies having a large number of these new type mills now in operation.

Acme White Lead and Color Works
Akron Paint and Varnish Company
American Printing Ink Company
American Varnish Company
Arco Company
Armstrong Cork Company
Ault & Wiborg Corporation
Ault & Wiborg Ribbon & Carbon Company
R. A. Becker Varnish Company
Bennett Glass & Paint Company
Boston Varnish Company
Boydell Bros. White Lead & Color Company

Brown Company
Buckeye Ribbon & Carbon Company
Button Corporation of America, Inc.
Andrew Brown Company
Carbide & Carbon Chemical Company
Carpenter-Morton Company
Carter Paint Company
Clark Paint & Varnish Company
Clinton Company
Cincinnati Chemical Works
Columbus Varnish Company
Cook Paint & Varnish Company
Diamond Alkali Company
Dibble Color Company
E. I. duPont de Nemours & Co., Inc.
Du Pont Rayon Company
Ditzler Color Company
Egyptian Lacquer Mfg. Company
101 Filtrol Company of California
Gilman Paint & Varnish Company
Grand Rapids Varnish Corporation
Leon Finch, Ltd.
Forbes Varnish Company
Fraser Paint Company
Geigy Company, Inc.
P. D. George Company
The Glidden Company
A. C. Horn & Company
J. M. Huber Company
Humble Oil & Refining Company
Imperial Varnish & Color Company
Intag Company
International Paints, Ltd.
C. E. Jamieson & Company
International Printing Ink Corp.
Johns-Manville, Inc.
Jones-Dabney Company
S. C. Johnson & Son, Inc.
Keystone Varnish Company
Lenair Company
Larkin Company, Inc.
G. J. Liebich Company

Lowe Brothers Company
McCaskey Register Company
Martin Senour Company
Matson Brothers Company
Merrimac Chemical Company
Miller-Bryant Pierce Company
J. W. Mortell Company
J. H. Morin & Company, Ltd.
E. C. Mullen Company
R. N. Nason & Company
North American Paint & Chemical Co.
Norton Company
Patterson-Sargent Company
Peaslee-Gaulbert Paint & Varnish Co.
Pittsburgh Plate Glass Company
Portland Cement Association
Pratt & Lambert, Inc.
K. J. Quinn & Company, Inc.
Red Hand Composition Company
Resinox Corporation
Richardson Company
Rinshed-Mason Company
Roxalin Flexible Lacquer Company
Ruberoid Company
Salesbook Manufacturing Company
Sandoz Chemical Company
Sewall Paint & Varnish Company
Sherwin-Williams Company
Smith-Alsop Paint & Varnish Company
Solar Corporation
Standard Varnish Company
Stanley Chemical Company
102 M. B. Suydam Company
The Ferbert-Schorndorfer Company
The Monarch Cement Company
Thresher Varnish Company
Texas Cement Plaster Company
Toledo Synthetic Products Company
Tousey Varnish Company
Trojan Lacquer Company
Universal Solvents, Inc.
Valentine & Company

Viscose Company
Vita Var Corporation
Westinghouse Electric & Mfg. Company
Young Aniline Works, Inc.

Over Three Hundred Thousand Dollars worth of these mills were built and installed in 1937 in paint, ink and other process plants in the United States alone.

The enthusiasm with which these mills have been accepted by the paint and printing ink industries has spread abroad and a number of mills are now in operation in Canada, England and Australia, and repeat orders have been received from some of these countries.

Some American companies, The Sherwin-Williams Company for instance, in whose American plants these machines are now in use, have ordered machines for use in their plants in other countries.

When these mills were first presented to the paint trade they met to a certain extent with the ridicule of paint chemists and production men who claimed that absolutely uncontaminated black product could not be produced in a steel mill, let alone a product such as red, blue, yellow or green, and most production men predicted that colors could never be ground in a mill of this type.

Brolite Lacquer and Synflex

ANDREW BROWN COMPANY
MAIN OFFICE AND FACTORY • 5431 SOUTH RIVERSIDE DRIVE
LOS ANGELES, CALIFORNIA, U. S. A.

LOS ANGELES
SAN FRANCISCO
CHICAGO
HOUSTON
SEATTLE
Cable Address
"BROLITE"
Los Angeles

February 2, 1938

Mr. R. L. Cawood, Pres.
Patterson Engineering Co.
East Liverpool, Ohio

Dear Sir:

We have had a Chrome Manganese Ball Mill in operation in our plant for the past two years. It is used principally for grinding lacquer and synthetic undercoats although we have ground every type of protective coatings with it.

We have been able to grind white, gray, red, and brown, and also darker colors without discoloration from the balls and it is only a simple washing operation to change from one color to another.

I hope this information will be of value to you.

Yours sincerely,

ANDREW BROWN COMPANY
B. E. Preston, Factory Sup't.

BEP:J

Fine
Old Colony
NORTH AMERICAN
PAINT & CHEMICAL CO.
LTD.

xxxxxxxxxxxx 620 Lamar St.
LOS ANGELES

February 3, 1938

Patterson Foundry & Machine Co.
East Liverpool, Ohio

Attention: Mr. R. L. Cawood

Dear Sir:-

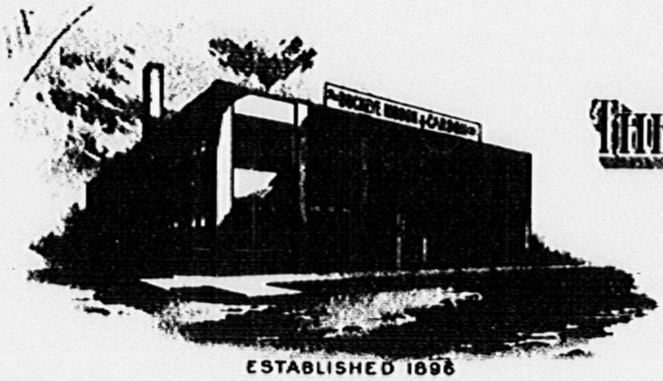
We have two of your water cooled Chrome Manganese Steelball Mills, one of which has been in operation for over three years.

We make Synthetics of all colors on these mills and find a great saving both of time and labor. We also find these mills of value in grinding floor enamels and other products, particularly those that are hard to grind on other equipment.

Yours very truly,
NORTH AMERICAN PAINT & CHEMICAL CO., LTD.

Joseph F. Hartley
J. F. Hartley - Vice President

JFH/mt



THE BUCKEYE RIBBON & CARBON CO.
MANUFACTURERS OF
CARBON PAPERS, TYPEWRITER RIBBONS,
INKED RIBBONS FOR ALL PURPOSES,
CLEVELAND, OHIO, U.S.A.
1458-1466 EAST 55TH STREET

February 3, 1938.

Patterson Foundry & Machine Company,
East Liverpool, Ohio.

Gentlemen:

With reference to the uses and application of Chrome Manganese Steel Mills, we are glad to advise you that we have been able to successfully grind our carbon dope in your new type mill with considerably less contamination than we formerly experienced in using your regular high carbon steel mill.

We find the lack of contamination due to your present arrangement of veining your mills. The old arrangement of lifter bars was undoubtedly responsible for the great amount of contamination.

This new type of mill is not only advantageous from a standpoint of manufacturing costs but it is particularly desirable due to its versatility insofar as we are able to grind any color and type of carbon ink.

Cordially yours,

THE BUCKEYE RIBBON & CARBON CO.

F. M. Pollock
Sec.-Treas.

FMP-D

FEB 4 1938

Bucki Brands

By Invitation Member
Emblem of
BUSINESS CHARACTER
Rice Leaders of the World Association
Represents High Standing in NAME - PRODUCT - POLICY

THE R. A. BECKER VARNISH COMPANY
MANUFACTURERS OF
VARNISH -- ENAMEL -- LACQUER
CINCINNATI, OHIO February 5, 1938

Patterson Foundry and Machine Co.,
East Liverpool, Ohio

Attention, Mr. R. L. Cawood, President.

FEB 11 1938

Gentlemen:

We have bought over a period of the last three years, three of your high speed chrome manganese mills, to be used in dispersing pigments in vehicles in the manufacture of industrial finishes.

We have found that these mills have a very large range so far as the colors which may be ground on them. We have ground oranges, yellows, reds, browns, light greens, grays, red oxides, carbon blacks, lamp blacks and in fact almost the full color range of pigments satisfactorily on these mills.

We have experienced no contamination in any of the products ground. We can conservatively say that the grinding time has been at least cut in half when we used these high speed chrome manganese mills, as against the older type pebble mills.

These mills were bought to replace older equipment. Because of the very much increased efficiency and flexibility so far as shades are concerned, they of course have proved a very good investment.

Very truly yours,

THE R. A. BECKER VARNISH COMPANY,

By E. D. Becker
Secretary-Treasurer.

edbj

ESTABLISHED 1885

TOUSEY VARNISH COMPANY

CHICAGO

GENERAL OFFICES AND FACTORY
520 WEST TWENTY-FIFTH STREET

MANUFACTURERS OF
VARNISHES
ENAMELS
SYNTHETICS
LACQUERS

February 7th
1 9 3 8

Mr. R. Rullman
5214 Kimball Avenue
Chicago - Illinois

Dear Mr. Rullman:-

This will refer to your visit to the writer's office asking just how we are using the unlined mills which we purchased from you.

We have been grinding oil and synthetic types of enamels in all colors with the exception of white and chinese blues. We have had no call for the chinese blue, hence the foregoing statement, however, on the whites we have made small batches in the 50-gallon mills. The grinding time on these various colors has ranged from ten to thirty-six hours.

We sincerely trust this is the information you desire, and with personal regards, we are,

Very truly yours -

TOUSEY VARNISH COMPANY

C R Heagstedt
Vice President

CRH:S

Telephone Seeley 0106

AMERICAN PRINTING INK COMPANY
DIVISION GENERAL PRINTING INK CORPORATION
MAIN OFFICE AND FACTORY, CHICAGO, ILLINOIS
Address Your Reply to
2314-2324. WEST KINZIE STREET
CHICAGO

February 7, 1938.

The Patterson Foundry & Machine Co.
East Liverpool, Ohio.

THE MERCHANDISE HEREIN REFERRED TO IS SOLD WITHOUT WARRANTIES EXPRESS OR IMPLIED.
ANY WAIVER OF THIS CONDITION MUST BE IN WRITING SIGNED BY AN OFFICER OF THE SELLER.

Dear Sirs:

Confirming our discussion with you concerning the 5x4' Unlined Chrome Manganese Mill, which we purchased from you some two years ago.

Using this Unlined Mill with Chrome Manganese Balls, we save considerable time over our former method of grinding in porcelain or buhrstone lined mills, using pebbles for a grinding medium.

This mill is being used for grinding rotogravure inks, ranging in colors from a white base, to yellows, reds, blues, browns, greens and blacks.

With best wishes, we are

Yours very truly,

AMERICAN PRINTING INK COMPANY
Division General Printing Ink Corporation

Harold A. Kernell
Harold A. Kernell
General Manager

HAK:GH

FEB 11 1938

CONVINCE WITH COLOR

PITTSBURGH
PLATE GLASS COMPANY

PAINT & VARNISH DIVISION
MILWAUKEE, WIS.

FREDERICK L. THEURER
PRODUCTION MANAGER

ADDRESS REPLY TO
235 E. PITTSBURGH AVE.

February 9 1938

√

Patterson Foundry & Machine Company,
East Liverpool, Ohio

Gentlemen:

We have in production a number of your 5' x 4', 4'6" x 3'6" and 2' x 3' Type DJ unlined Manganese Mills with Chrome Manganese Balls which have been used for grinding all colors including White, White Base, Yellow, Red, Green, all types of Blues, Oxide Reds and Browns and Black in Synthetic and Oleo Resin Varnish bases.

Yours very truly,

Frederick L. Theurer.

Production Manager.

FEB 11 1938

62

R. H. CLINTON, President
D. L. CLINTON, Vice President
R. H. CLINTON, JR. Secretary
L. CUDDEN, Treasurer

TELEPHONE
ARMITAGE 7760

THE CLINTON COMPANY

MANUFACTURERS AND IMPORTERS
LACQUERS - THINNERS - PAINTS - ENAMELS - SYNTHETICS
VARNISHES - STAINS - SHELLACS - FILLERS
WALLBOARD, ACOUSTICAL, AND RUBBER TILE ADHESIVES
OFFICE AND FACTORY - 1210-1230 ELSTON AVENUE

CHICAGO

Feb. 9, 1938

Patterson Foundry & Machine Co.,
5214 N. Kimball Ave.,
Chicago, Ill.

Gentlemen:

Referring to the Chrome Manganese Mill that we are using of Patterson make, we wish to advise that we are using this mill in grinding a Chrome Green paint having more or less an abrasive character and we find our grinding time and facilities for grinding are considerably better than by previous methods of grinding.

We find no contamination, and if any, it is not apparent.

We trust this will answer your inquiry.

Yours very truly,
THE CLINTON COMPANY

R H Clinton

President

nn

THE MAKERS OF JOHNSON'S WAX

S. C. JOHNSON & SON, INC. Racine, Wisconsin

PURCHASING DEPARTMENT

RACINE, WIS. • BRANTFORD, CANADA • WEST DRAYTON, ENGLAND • SYDNEY, AUSTRALIA • PARIS, FRANCE • BERLIN •

February 9, 1938

Patterson Foundry and Machine Company
East Liverpool
Ohio

Gentlemen:

In accordance with Mr. Rullman's request, we confirm our advice to him that in addition to several of your porcelain lined mills we are using your 6 x 8 and 5 x 6 D.J. unlined chrome manganese mills. In these mills we are grinding house paints as well as enamels with both natural resin varnish and synthetic resin varnish bases, in all colors.

Our experience with the unlined mills has shown us that grinding is faster in them than in the lined mills.

Yours very truly,

S.C.JOHNSON & SON, INC.

R P Gardiner
Purchasing Agent

RPGardiner/CE

BRANCH OFFICES
ATLANTA
BOSTON
CHICAGO
CINCINNATI
CLEVELAND
DALLAS
DENVER
DETROIT
KANSAS CITY
LOS ANGELES
MILWAUKEE
NEW YORK CITY
OMAHA
PHILADELPHIA
PITTSBURGH
ST. LOUIS
ST. PAUL
SAN FRANCISCO
SEATTLE

L7F

DIBBLE COLOR COMPANY
MANUFACTURERS
LACQUERS, ENAMELS AND PAINTS
1497 EAST GRAND BOULEVARD AT CANTON
DETROIT, MICHIGAN

February 9, 1938

The Patterson Foundry & Machine Company
2832 East Grand Boulevard
Detroit, Michigan

Attention: Mr. F. R. Conklin

Gentlemen:

About a year ago, we purchased two of your High Speed Chrome-Manganese Mills. Since that time we have had an opportunity to grind various types of paint products in the mills with the following results.

The time of grinding, when compared with a pebble mill, is less than one-half and slightly less than the time required for a ball mill. While we do observe a slight contamination in the manufacture of Whites in this type of mill, yet, we are able to grind White Tint Bases which permit us to make the most delicate tints from the mill base. It is our opinion that the slight color contamination can be attributed to the chromium steel balls rather than the mill proper.

Due to the improved cooling of the mill, we are able to decrease considerably the amount of gelling and livering which we formerly encountered in the ball mill of the old type.

We have manufactured White Tint Bases, Iron Oxide Primers, Gray Lacquer Enamels and Black Synthetic Enamels in the mills. Our business has not warranted our using the mills for very many colors but we would not hesitate to consider them if they were needed.

Very truly yours,

DIBBLE COLOR COMPANY

EWFarmer

E. W. Farmer
Assistant General Manager

EWF:rmb
cc att.

FEB 11 1938

TELEPHONE MELROSE 4270

THE FOY PAINT COMPANY, INC.
Makers of
PAINTS-VARNISHES-LACQUERS

FOYS

CINCINNATI, OHIO
(NORWOOD)

E. A. FOY, JR., PRESIDENT
GEO. W. SCHNEIDER, EXECUTIVE VICE PRES
AND GENERAL MANAGER
GEO. C. VOLL, VICE PRESIDENT
AND DIRECTOR OF SALES
WM. F. REHME, SECRETARY
CHAS. A. HEITMAN, TREASURER

OFFICE & FACTORY
1775 MENTOR AVE.
BRANCH
230 E. FIFTH STREET
TELEPHONE MAIN 5271

February 10, 1938

Patterson Foundry & Machine Co.,
East Liverpool, Ohio.

Attention: Mr. R. L. Cawood

Gentlemen:-

Within the past three months we have installed one of your High Speed Chrome Manganese Mills. So far we have used this Mill for the grinding of iron oxides and natural earth colors for paint and enamel products.

We would say they have ground the pigments entirely satisfactory, in fact more satisfactorily than the method which we formerly used. The former equipment used was Five Roll Mills.

While we have not made a direct comparison between Pebble Mill grinds and Ball Mill grinds, we feel sure that the grinding time in most cases can be cut in half with the use of the High Speed Chrome Manganese Mill.

While we have not adapted this Mill for the grinding of light shades, we intend to go into this matter within the next few months and feel sure, in the light of what we have heard, that we will be able to use the Mill for the making of some of these light color paints at a saving in cost to us.

We will keep you advised of the progress we are making with this equipment.

Yours very truly,

THE FOY PAINT COMPANY, Inc.

By

PRESIDENT

EAFJr:IMW

Save the surface and you save all

VED

FEB 11 1938

Established 1878

CABLE ADDRESS
AULTWIBORG
NEW YORK, N. Y.

Ault & Wiborg Corporation
A SUBSIDIARY OF INTERCHEMICAL CORPORATION
Builders of fine industrial finishes
FACTORIES - CINCINNATI, OHIO

BOX 17, EVANSTON STATION
CINCINNATI, OHIO

February 10, 1938

FEB 11 1938

Patterson Foundry & Machinery Company
East Liverpool, Ohio

Atten: Mr. R. L. Kaywood, President

Gentlemen:

8
3

We have installed in our plant approximately eight chrome manganese steel ball mills that have been in operation approximately three years. These mills have been charged with a chrome manganese steel ball approximately the same texture as the mill.

These mills have been used for various types of products connected with the paint industry, and are used to grind various types and colors of pigment. In our experience we find that we are able to grind all colors from a tinted white to black without undue contamination or discoloration. These colors include, of course, chrome yellows, chrome greens, blues and reds. The reason we adopted this type of mill was due to this particular fact.

We have also discovered that in our particular line we have products that can only be satisfactorily ground on this type of mill, regardless.

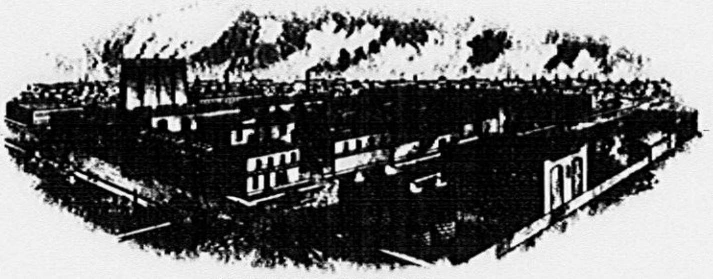
Compared with grinding periods necessary on old type pebble mills, we find that we have reduced our grinding time at least one half, and in some instances we have gone beyond that.

We consider this type of equipment in most instances, the most practical piece of equipment for paint grinding available on the market today, particularly from an economical point of view.

Yours very truly,
AULT & WIBORG CORPORATION
H H Harnden
H. H. Harnden
Superintendent

HHH:mh

BRANCHES: NEW YORK PHILADELPHIA BOSTON CLEVELAND BALTIMORE BUFFALO NEW ORLEANS CHICAGO DETROIT ST. LOUIS SAN FRANCISCO
LOS ANGELES LONDON SHANGHAI HONG KONG MANILA, P. I. BUENOS AIRES CAPETOWN, UNION OF SOUTH AFRICA


SPRING AND COZZENS

The Columbus Varnish Co.
Makers of Fine Varnishes
Columbus, O.

February 11th, 1938

Patterson Foundry & Machine Co.,
East Liverpool, Ohio.

Attention: Mr. Richard L. Cawood.

Gentlemen:

The new High Speed Chrome-Manganese mill which we put into service last year has given us very excellent results. While it has enabled us to reduce the necessary grinding time at least 40%, the biggest advantage has been in the improvement in the quality of our product.

Before putting this mill into service we were continually having trouble with fine particles in our stocks which could not be eliminated by further grinding in our old type steel ball mill. Since using our new mill we have had no further trouble. We feel that your new High Speed Chrome-Manganese mill is an outstanding contribution to the industry.

Very truly yours,
THE COLUMBUS VARNISH CO.
By Ralph P. Ermer

RPE:AS

RECEIVED
FEB 12 1938

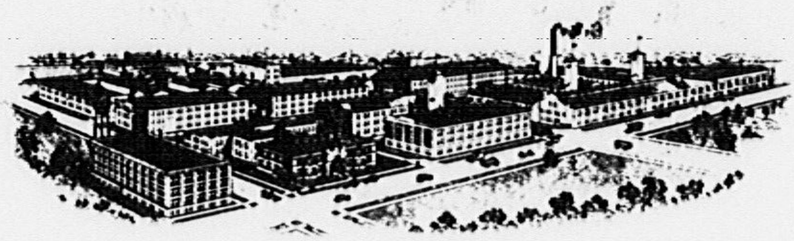
ACME WHITE LEAD AND COLOR WORKS

FACTORIES
DETROIT
LOS ANGELES
DALLAS
LINCOLN

DISTRIBUTING BRANCHES
IN PRINCIPAL CITIES

MANUFACTURERS OF
ACME QUALITY
Paint·Varnish·Lacquer

ADMINISTRATION OFFICES
8250 ST. AUBIN AVENUE
DETROIT, MICH.



DETROIT, MICH.

February 11, 1938

Mr. R. L. Cawood
The Patterson Foundry & Machine Company
East Liverpool, Ohio

Dear Sir:

Your Mr. Conklin came into see us with a request that we write you concerning the use of your ball mills in our plant. We are glad to do this as we have found your equipment very satisfactory and in general does the work we have to do to our entire satisfaction.

The equipment has some outstanding attributes which I might ennumerate as follows:

1. Colored enamels, paint, etc. ground in the mill are not contaminated with iron particles or silica particles as is often the case when pebble mills are used.

2. The time of grinding by the use of your mills has been cut in half over that of pebble mill equipment.

3. The up-keep of these mills is a very slight amount. We have had mills in use for several years and apparently there is very little wear and tear on the mill itself.

4. We have not been using your mill for the manufacture of White coating. There is no doubt in my mind that we could use it to some extent but we have other equipment (5 roll mills which we use for this purpose).

5. In general we use this mill to manufacture portions of our standard shelf trade sales lines, namely, Enamel-Kote, Proxlin, Proflex and Fleet-X. These items are ordinarily oleo resinous type enamels, nitrocellulose lacquers, and synthetics.

February 11, 1938

Mr. R. L. Cawood
The Patterson Foundry & Machine Company
East Liverpool, Ohio

It is my understanding that this letter is to be used by you with the Patent Office in Washington, and is not to be used for local or national advertising.

Sincerely yours,

Ellis

C. T. Ellis

Factory Manager

67353 DY

Note: This information is strictly confidential and is not to be used for publicity or advertising of any sort.

CARPENTER-MORTON
QUALITY SINCE 1840
MANUFACTURERS OF CARMOTE PAINTS PAINT PRODUCTS

E. E. MORTON, President
A. I. McLAUTHLIN, Vice President
W. E. GILMOUR, Treasurer
J. D. MORTON, Secretary

77 SUDBURY STREET, BOSTON, MASS.

BOSTON
NEW YORK
PHILADELPHIA

March 2, 1938

The Patterson Foundry & Machine Co.,
117 Liberty St.,
New York, New York.

Att: Mr. Kenneth S. Valentine

Gentlemen:

Beg to advise that we have had one of your type "D" Chrome-Manganese Mills in operation for approximately six months. This has been working largely on Carbon Blacks, Prussian Blues and C P Chrome Greens. So far, it has given us excellent satisfaction.

We are able to do our grinding on an average of 33% shorter time than we were able to do it with an ordinary type steel ball mill and we have not as yet experienced any difficulty with contamination.

Yours very truly,

CARPENTER-MORTON CO.

P J Roberts

Factory Mgr.

PJR/S

VED.

MAR 10 1938

MAR 3 - 1938

MONSANTO CHEMICAI

MERRIMAC DIVISI

BOSTON, MASS.
EVERETT STATION

Note: This information is strictly confidential and is not to be used for publicity or advertising of any sort.

March 2, 1938

The Patterson Foundry & Machine Co.
117 Liberty Street
New York, N. Y.

Attn - Mr. Kenneth S. Valentine

Dear Sir:

We are pleased to report that a Patterson Chrome steel mill installed at our lacquer plant in September 1937, to replace an ordinary steel mill of like capacity, has reduced the grinding time on carbon blacks to sixty percent of that formerly experienced.

A smoother and more uniform grind is being attained.

Very truly yours,
H. N. Stevens
H. N. Stevens,
Dept. Supt.

HNS F.

MAR 10 1938

MAR 4 - 1938

upon the inner surface of said shell; the successive waves or undulations provided by the working surfaces of said plates, collectively considered, differing from one another in wave length and in amplitude.

Signed at San Francisco, in the county of San Francisco and State of California, this 12th day of April, A. D. 1915.

ALEXANDER V. JENSEN.

Witnesses:
M. V. Collins,
J. W. Plant.

145 Endorsed: Library Jun 12 1917 U. S. Patent Office

105,614

Patent Specification

Application Date, Apr. 19, 1916. No. 5742/16.

Complete Accepted, Apr. 19, 1917.

Complete Specification.

Improvements in and relating to Ball-mills.

We, W. Everitt & Company, Limited, Analysts and Manufacturing Chemists, and Walter Everitt, Engineer and Chemist, all of Norwood Wharf, Southall, Middlesex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to ball-mills and consists in the provision in the manner shown in the accompanying drawings of ribs on the internal surface of the cylindrical wall of the mill to increase the play of the balls.

Hitherto the ribs of ball-mills have not been integral with the cylindrical wall of the mill but have formed a built up separate liner or have been cast integral with a liner fitting inside the cylindrical wall of the mill.

The mill may be used in carrying out the process described in the Specification accompanying Patent No. 105,611.

The mill according to the present invention is illustrated by way of example in the accompanying drawings in which:—

Fig. 1 is a longitudinal elevation and

Fig. 2 a section on the line II—II Fig. 1.

In these drawings 1 is the cylindrical wall of the mill the internal surface of which is provided with four ribs 17, 17 having in section the rounded profile shown in Fig. 2. The height of the ribs is approximately equal to the diameter of the balls 18, 18 of which one or two hundred may be employed, Figure 2 showing a few by way of example.

Referring now to other constructional details of the mill which are not claimed to be new, 2, 3 are the end plates provided with trunnions 4, 5 respectively, each of which rests on rollers 6, 6 running in bearings on the pedestals 13. To the end plate 2 there is fixed a spur-wheel 7 driven by the pinion 8 on the shaft 9 supported on the pedestals 10, 10 and carrying the fast and loose pulleys 11, 12. The trunnion 5 is bored to receive the pipe 14 which passes through the bracket 15 in which it is clamped so that it cannot revolve. The outer end of the trunnion 5 is provided with a stuffing box 16 to make a fluid-tight joint between the outer surface of the pipe and the bored hole in the trunnion. The outer end of the pipe 14 is provided with a thread so that by means of suitable connections fluid can be passed in or out of the mill. The plug 19 is provided to enable the mill to be charged and discharged.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

A ball-mill having a cylindrical wall the internal
146 surface of which is provided as shown in the accompanying drawings with integral ribs to increase the play of the balls.

Dated this 19th day of April, 1916.

CLEMENT LEAN, B.Sc.,
Chartered Patent Agent,
231, Strand, London, W.C.,
Agent for the Applicants.

Redhill: Printed for His Majesty's Stationery Office, by
Love & Malcomson, Ltd.—1917.

148 Endorsed: Mailed Apr 11 1938

EJD/c

#11

Department of Commerce

United States Patent Office

Washington

Before the Board of Appeals

On Appeal

In re application of Richard L. Cawood Serial No. 67,353
Filed March 5, 1936 For: Ball Mills

Examiner's Statement

This is an appeal from the action of the Primary Examiner finally rejecting claims 1 to 10, all of the claims in the above entitled application.

The appealed claims read:

1. An improved ball mill which includes a cylindrical shell having stream-lined enlargements located at intervals and extending throughout the length of the inner wall of the mill, said enlargements being convex with relatively long-radius curves joining the sides thereof with the wall of the shell.

2. An improved ball mill which includes a cylindrical shell having stream-lined enlargements located at intervals and extending throughout the length of the inner wall of the mill, these enlargements preferably formed integral with the wall of the shell, said enlargements being convex with relatively long-radius curves joining the sides thereof with the wall of the shell.

3. An improved ball mill which includes a cylindrical shell having stream-lined enlargements located at intervals and extending throughout the length of the inner wall of the mill, these enlargements arranged parallel with one another, said enlargements being convex with relatively long-radius curves joining the sides thereof with the wall of the shell.

149 4. A ball mill including a shell having stream-lined enlargements preferably formed integral with

the inner wall and parallel with the axis of the mill, these enlargements being in the form of a generally continuous more or less compound curve throughout the transverse area, said enlargements being joined to the inner wall of the shell by curves, each having a transverse radius approximately equal the transverse radius of the inner portion of the enlargement.

5. A ball mill comprising a shell having ribs on the inner wall thereof, each rib in cross-section having a convex inner surface joined to the inner wall of the shell by concave surfaces, the radius of each concave surface being at least as long as the radius of the convex surface.

6. A ball mill comprising a shell having ribs on the inner wall thereof, each rib in cross-section having a convex inner surface joined to the inner wall of the shell by concave surfaces, the radius of each concave surface being greater than the radius of the convex surface.

7. A ball mill comprising a shell having integral ribs formed on the inner wall thereof and extending parallel with the axis of the shell, each of said ribs having a convex inner surface joined to the inner wall of the shell by concave surfaces, the radius of each concave surface in cross-section being appreciably greater than the radius of the convex surface.

8. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said shell having integral stream-lined enlargements extending lengthwise of the inner wall of the shell and located at suitable distances apart, these enlargements in cross-section approximately in the arc of a circle at their apexes, with their sides gradually and approximately uniformly sloping and curving in opposite directions from the curvature of the apex and merging into the wall of the shell in the general form of a compound curve from apex to shell whereby the balls roll over and follow the wall of the shell and surfaces of the enlargements, first up on one side, and
150 then down on the other in cascades without jumping
and leaping thereover, creating the smooth, rubbing action essential to proper dispersion of pigments or other material in oils or other vehicles.

9. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said shell

having integral stream-lined enlargements extending lengthwise of the inner wall of the shell and located at suitable distances apart, the apexes of these enlargements convex, and the opposite sides thereof concave in cross-section and of such profile as to create and insure the cascading of the balls in continuous contact in transit up one side, over the top, and down the other side of the enlargements without jumping or leaping.

10. A ball mill comprising a shell, the major portion of the inner wall of which is smooth and cylindrical, said shell having integral stream-lined enlargements extending lengthwise of the inner wall of the shell and located at suitable distances apart, these enlargements in cross-section approximately in the arc of a circle at their apexes, with their sides gradually and approximately uniformly sloping and curving in opposite directions from the curvature of the apex, and merging into the wall of the shell in the general form of a compound curve from the apex to the shell to cause the balls to roll smoothly up one side, over the top, and cascade down the opposite side to the surface of the shell without leaping or jumping, resulting in a smooth rubbing action on the material treated within the shell.

The references relied upon by the examiner are:

Everitt & Co. (British)	105,614	April	19, 1917	83/9
Jensen	1,291,008	January	14, 1919	83/12

The subject matter of the claims is a device for grinding paint products comprising a rotatable cylindrical drum containing a charge of smooth cylindrical balls as the grinding media. The alleged invention set forth in the
claims relates more specifically to the inner surface
151 of the drum for causing the balls to carry out a spe-
cific cascading action upon rotation of the drum.
Spaced at intervals about the smooth inner cylindrical surface of the drums are integral stream-lined enlargements running longitudinally of the drum and functioning as lifters for the balls. These enlargements or ridges in cross-section are in the form of an unbroken compound curved wall of the drum. The ridges are so shaped as to prevent the balls from jumping away from the surface and hammering the surface of the drum during cascading.

Claims 1, 2 and 3 are rejected as unpatentable over the British patent to Everitt and Company. In this patent the stream-lined enlargements 17 are shown convex. The further limitation that the enlargements are convex "with relatively long-radius curves joining the sides thereof with the wall of the shell", is not seen to patentably distinguish over the concave cylindrical surfaces joining the sides of the enlargements 17 of Everitt with the wall of the shell. The radius of the concave cylindrical surfaces of Everitt are held to be relatively long. Moreover, the patent to Jensen shows the feature of having convex enlargements in the drum with relatively long radius curves joining the sides thereof with the wall of the shell to be old. To so shape the curves joining the sides of the convex enlargements 17 of Everitt with the wall of the shell would not require invention.

Claims 4 to 7 are rejected as unpatentable over
152 the patent to Everitt in view of Jensen for the reasons given above against claim 1. The limitation that the radius of curvature of the convex inner surface of the enlargement or rib in cross-section is approximately equal to the radius of curvature of the concave surface which joins the rib to the shell or drum, is seen to be met in the disclosure of Figures 1 and 2 of Jensen.

Claims 8, 9 and 10 are rejected as unpatentable over Everitt in view of Jensen for the reasons given above against claim 1. Further it is held that the function set forth in the last six lines of these claims for the enlargements could be performed by the enlargements of Everitt if the shell of Everitt was rotated slowly.

Claims 1 to 7 are further held to read, in all material respects, on the patent to Jensen taken alone. In the cylindrical shell of Jensen the alternate stream-lined enlargements are located at "intervals". It is held to be a matter of indifference whether the enlargements are integral with the wall of the shell or rigidly secured thereto. Moreover, the feature of having the enlargements integral with the wall of the shell is shown by Everitt.

It does not appear that applicant has combined in the structure of the shell any of these features to produce any new result and the claims are thought to have been properly rejected.

Respectfully submitted,

C. F. BLAKELY
Examiner, Division 25

153 Endorsed: U. S. Patent Office Board of Appeals Oct 20 1938 Mailed

Appeal No. 25,555 Paper No. 16

Decision

VFM

Appeal No. 25,555

Hearing: October 17, 1938

In the United States Patent Office

Before the Board of Appeals

Ex parte Richard L. Cawood

Application for Patent filed March 5, 1936, Serial No. 67,353. Ball Mills.

Messrs. Vernon E. Hodges & H. Hamlin Hodges for applicant.

This is an appeal from the final rejection of all the claims in the application, namely, 1 to 10.

Claim 4 is illustrative.

4. A ball mill including a shell having stream-lined enlargements preferably formed integral with the inner wall and parallel with the axis of the mill, these enlargements being in the form of a generally continuous more or less compound curve throughout the transverse area, said enlargements being joined to the inner wall of the shell by

curves, each having a transverse radius approximately equal the transverse radius of the inner portion of the enlargement.

The references relied upon by the examiner are as follows:

Everitt & Co. (Brit.)	105,614	Apr. 19, 1917
Jensen	1,291,008	Jan. 14, 1919

The subject matter of the claims on appeal is a ball mill provided on the interior surface with a plurality of ridge-like members designated stream-lined enlargements
154 in the claims. These elevations extend parallel with the axis of the mill. Each has a rounded top and sides formed by shallow or gentle curves to merge with the walls of the shell between the ridges. It is emphasized that the dimensions and proportions as to shape of the ridges are such that the balls will roll smoothly up one side and over the top and down the other side without leaving the surface.

The state of the art discloses that the basic principle of applicant's apparatus has been recognized, that is, to provide longitudinal ridges in grinding mills to reduce the tendency of the charge to bodily slide as a mass in the mill. Jensen sets forth this purpose and discloses a plurality of longitudinal ridges having rounded tops and of very gentle or shallow curved adjoining surfaces. The dimensions shown by Jensen appear to be fully equivalent to those particularly set forth in applicant's case. It is our opinion that the constant contact of the balls or rollers with the surface of the mill would be as true of Jensen as of applicant's construction so that the results included in claims 4, 8, 9 and 10 are accomplished alike in both cases.

The patent to Everitt discloses a similar structure with like rounded ridges or enlargements, the sides of which merge with the wall of the cylinder by reverse curves. While it seems that the reverse curves of Everitt's mill are somewhat sharper than the relatively flat or gentle curves in applicant's mill, still it is not believed that the terms of the claims define thereover. However, Everitt discloses a structure in which the ridges are formed integrally with the shell rather than of separate curved sheets as in
155 Jensen.

It is stated in the brief that claims 4, 8, 9 and 10 best represent the invention. Of these claims, claim 4 sets forth to a certain extent the structure in terms of elements and degree of curvature. It is found that the terms of this claim may be read upon each of Jensen and Everitt. In such case where Jensen discloses fully the function and object to be obtained by so proportioning the curvature of the surfaces and where Everitt discloses integral ridges, it is our view that invention is not involved.

Claims 8, 9 and 10 define the mill in relatively broad terms as to curvature followed or modified by a "whereby" clause. The structure so far as defined in these claims is believed fully anticipated by Jensen and the limitation that forming the ridges integrally with the shell is believed without patentable merit in view of Everitt as in claim 4. So far as the action of the mill is involved, we find no difference in the integral structure over the lined structure of Jensen. This is believed to be merely a question of choice in the manufacture of the apparatus rather than any difference in function thereover.

From the brief it is understood that the appeal as to claims 1, 2, 3, 5, 6 and 7 is no longer prosecuted before us.

Claim 11 is referred to in the brief but this claim was not entered and not considered in the examiner's answer and is accordingly not formally on appeal.

Some evidence in the form of testimonial letters in regard to the commercial success of applicant's mill have been submitted but we do not find these necessarily
156 relevant to the question of patentability over the
state of the art. Commercial success of the mill may depend at least in part upon other important factors other than the mere shape of the ridges such as the fact that the shell and ridges may be of special or particularly hard alloy. There is no showing and so far as can be observed, no reason to assume that the mill of Everitt and Company if made of equally suitable material would not function with results comparable to those indicated in the letters. We consider it is within the rights of the public to give the interior formation of Everitt's integral ridges the same as

that shown for Jensen's ridges particularly since Jensen discloses fully the theory of action of this type of ridge.

The decision of the examiner is affirmed.

EUGENE LANDERS
Examiner-in-Chief

W. L. REDROW
Examiner-in-Chief

W. L. THURBER
Examiner-in-Chief

Board of Appeals

October 20, 1938

Messrs. Vernon E. Hodges & H. Hamlin Hodges,
1101 Earle Bldg.,
Washington, D. C.

157 Endorsed: United States Court of Appeals for the District of Columbia Filed Aug 28 1940 Joseph W. Stewart, Clerk.

In the United States Court of Appeals for the District of Columbia

Docket No. 7750

Richard L. Cawood, *Appellant,*

vs.

Conway P. Coe, *Appellee.*

Joint Designation of Record In Re: Printing

It is hereby stipulated and agreed that the following pages and portions of pages of the certified record be omitted in the printed record:

Page 58 59 60 66 70 (lines 15 to 29 inclusive) 71 72 73 76 to 99 inclusive 100 (lines 1 to 11 inclusive) 103 104 105 121 122 126 130 to 137 inclusive 147.

158 It is further stipulated that the printed record be made up of photostatic reproductions of the following pages of the certified record:

Page 67 106 to 120 inclusive 123 124 125 127 128 129 143 144.

It is further stipulated that pages 138 to 142 inclusive, the pages of the Jensen patent, should not be printed, and that they will be furnished by the appellant in printed form for binding into the record.

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Endorsed on Cover: No. 7750 Cawood, Appellant, vs. Coe. United States Court of Appeals for the District of Columbia Filed Aug 21 1940 Joseph W. Stewart, Clerk.

IN THE

United States Court of Appeals for the District of Columbia

APRIL TERM, 1940.

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FILED DEC 11 1940
Joseph W. Stewart
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No. 7750.

RICHARD L. CAWOOD,
APPELLANT,

vs.

CONWAY P. COE, Commissioner of Patents,
APPELLEE.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES
FOR THE DISTRICT OF COLUMBIA.

BRIEF ON BEHALF OF APPELLANT.

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IN THE

United States Court of Appeals for the District of Columbia

APRIL TERM, 1940.

No. 7750.

RICHARD L. CAWOOD,
APPELLANT,

vs.

CONWAY P. COE, Commissioner of Patents,
APPELLEE.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA.

BRIEF ON BEHALF OF APPELLANT.

Jurisdictional Statement.

This is an *ex parte* appeal from a decision of the District Court of the United States for the District of Columbia, dated June 10, 1940.

Jurisdiction of the District Court of the United States for the District of Columbia as set forth in the Complaint, is under the patent laws of the United States, R. S. 4915 (U. S. C. Title 35, Sec. 63).

Jurisdiction of this Court in this case is predicated upon the Code of the District of Columbia, Title 18, Chap. 1, paragraph 1 (as amended September 4, 1935), this being an appeal to review the judgment of the court below, dated on or about June 10, 1940, affirming the decision of the Board of Examiners-in-Chief of the U. S. Patent Office.

The pleadings necessary to show existence of the jurisdiction above pointed out are the Complaint, commencing at page 1 of the record; the Answer commencing at page 11 and ending page 12 of the record; the Order Dismissing the Complaint, found at page 14 of the record; Notice of Appeal filed within the Statutory Period, on page 14 of the record; and the Bond on Appeal on page 14 of the record.

Statement of the Case.

This is an *ex parte* application filed in the U. S. Patent Office on March 5, 1936. After the usual prosecution before the Primary Examiner, it was appealed to the Board of Appeals on March 10, 1938, which Board affirmed the Examiner (R. 8-11). Thereupon on February 20, 1939, within the statutory period of six months, a Complaint was filed (R. 1 to 6) followed by the usual Answer on behalf of the Commissioner of Patents. The trial of the cause took place on May 22, 1940 (R. 15) before Mr. Justice Jennings Bailey, and was concluded on the same day, three witnesses having been presented and examined by appellant and cross-examined on behalf of defendant. At the conclusion of the trial the case was submitted without argument subject to the filing of Briefs by both sides by consent of the Court. Said Briefs were duly filed on or about May 27, 1940 by the appellant, and on or about May 29, 1940 by the defendant. A memorandum opinion by Mr. Justice Bailey dismissing the complaint with costs was rendered June 10, 1940. On June 26, 1940, findings of fact and conclusions of law and judgment were signed by Mr. Justice Bailey (R. 12-13). The case was then appealed to the U. S. Court of Appeals for the District of Columbia, July 15, 1940 (R. 14).

Statutes Involved.

The statutes here involved are:
R. S. 4915, U. S. C. Title 35, Sec. 63.

Code of District of Columbia, Title 18, Chap. 1, paragraph 1 (as amended September 4, 1935).

Statement of Points Relied Upon.

The Court erred in its conclusions of law as follows:

(1) By agreeing with the Board of Appeals of the Patent Office in holding that there is no invention in appellant's claims in view of the Jensen patent and dismissing the Complaint (R. 12).

(2) In including in the conclusions of law the Everitt British patent as well as the Jensen patent, on which patent only the memorandum opinion was based (R. 12 and 13), and in failing to differentiate appellant's invention over the patents to Jensen and Everitt.

(3) In the Court's failure to recognize the inventive act in re-adapting and re-fashioning a machine of the old ball-mill type, previously used only in the art of ore dressing, to a carefully planned structure capable of treating an entirely different material for which the patented structures were entirely inadequate and ill-contrived, and were never known to successfully disperse paint and ink products and were not in the forms disclosed in the patents adapted to or adequate for the accomplishment of the results attained by appellant.

Summary of Argument.

Description and discussion of appellant's invention.

Description and discussion of the Jensen disclosure.

Description and discussion of the Everitt publication.

Comparison of appellant's invention and differentiation of the patents cited thereagainst.

Apparent failure to show recognition of the new and improved results flowing from appellant's invention over the prior art.

A discussion of some of the many pertinent decisions included in the appendix.

ARGUMENT.

Statement of the Case.

This invention is a so-called ball-mill. Various types of ball-mills have been employed principally in the art of ore-dressing for many years. In ore dressing, it has been purely a matter of grinding and reducing the ore. Mere reduction in size of particles, to liberate the values and not extreme fineness was the desideratum. Pebbles or balls have been used in a rotary cylinder and by tumbling and sliding in it as the cylinder revolves the ore has been crushed to a certain degree, but in ore dressing, we repeat, since it was unnecessary, no attempt was made to greatly refine the particles of ore. Hence these machines were satisfactory for what they were intended.

Appellant was, apparently, the first to conceive the idea of adapting and utilizing the principle of the ball-mill for the *dispersion* of paint and ink products. To the casual observer, since its accomplishment, it may appear to be a very simple proposition, and the ultimate achievement resulting from twelve years of experimentation and testing out by the appellant may at first glance appear only slightly different from the disclosures of prior patents. That is, in effect, what the different tribunals of the Patent Office and the District Court concluded.

However, there is a great deal more in this invention that would appear on its face and at a glance.

In the first place, appellant is dealing with a very different material from ore and the ultimate results sought are widely different. He is dealing with different conditions, with different requirements, and with the result that he has succeeded in designing a machine having a wide range of usefulness in the art of dispersing paint and ink pigments, and he has accomplished this result with an improved ball-mill that had never been accomplished before.

Not only has he improved the quality and the range, but he has greatly reduced the time for treatment and the expense of operation, and in that way obtained *new results.*

To attain these new results, he has produced a mill with a definite streamlined internal surface, by so modifying previous constructions which proved inapt for his purpose until he turned their failure into success!

Perhaps few are better qualified than appellant to make these assertions, since he has for years been familiar with all types of ball-mills, having been a large manufacturer of them and having tried and tested them and discovered for himself their shortcomings and inefficiency, while having his objective in view and for the accomplishment of which he finally evolved the present invention. This invention is meeting with signal success. Five hundred of these machines have been sold and are in operation. One concern is using as high as forty-one machines in operation with thirty more on order (R. 28). It is unnecessary to urge that repeat orders are always significant. They are based on success and satisfaction, and not on theory or guesswork.

Reference to page 47 of the record will show the construction. It is a cylinder with enlargements 2 extending parallel with one another and the axis and throughout the length of the cylinder. These enlargements really are a thickening of the wall of the cylinder, and are preferably an integral part thereof, although not necessarily.

The object is to create a rolling flow of the balls as nearly as possible in constant rolling contact with the wall of the cylinder and the enlargements throughout their entire course as the cylinder rotates. These enlargements are necessary to prevent sliding and slipping, but are so designed as to prevent abrupt stoppage and plunging and leaping and "play" of the balls so that the balls roll and flow over the enlargements somewhat as a skier glides over smooth elevations or obstructions in his path.

The desideratum is to preserve the rolling contact at all times. Consequently the enlargements present a smooth gradual curve over the top like an inclined plane, and they are of a carefully calculated height which will at the same time accomplish the one desired purpose and preclude an undesirable result. The desired purpose is to sufficiently retard without obstructing, to the end that sliding of the balls is prevented, and to insure against abrupt stoppage which causes the balls to "play", jump and bound and descend on the other side with hammer blows. This hammering, which is avoided by appellant's invention, results in erosion and abrasion of both the balls and the ribs (as they are termed in the British patent to Everitt) with the fatal result that the metallic particles worn off by this action contaminate and discolor the paint and ink products, making it impossible to produce the required variety of delicate shades which is desirable, expected, and absolutely necessary in the dispersement of these pigments.

Prior Art.

Two patents have been cited by the Patent Office and considered by the Principal Examiner, the Board of Appeals, and the Trial Court, namely U. S. patent to Jensen, No. 1,291,008, January 14, 1919, and the British patent to Everitt, No. 105,614, of 1917.

(a) Jensen Patent No. 1,291,008.

The Jensen patent disclosed a cylinder 11, with an inner lining composed of corrugated plates which are overlapped at the edges in one form (Figs. 1 and 2) and bolted through the overlapping edges to the cylinder, or they may be held by rail-like bars 29 (Figs. 5 and 6) which as shown in Fig. 7 are held in place by the wedge-shaped bar 30 bolted through the cylinder.

While no such machine is in use to-day, yet for its intended purpose in the ore dressing art it at least may have functioned; but for appellant's purposes it would be an aboslute failure, and, on the face of it, it is clear that it was never intended or adapted for the treatment of paint and ink products. While the entire inner surface is of a wave-like profile, the fact that the interior is built up of separate plates overlapping one another at their contiguous edges, would defeat the very purpose of appellant's invention. *This is a vital defect and the importance of which has escaped or not impressed the previous tribunals.* Any crack or groove in the interior of one of these cylinders is not only objectionable, but also *would be fatal* to appellant's success. In the first place, metallic plates such as shown in Jensen could never be fitted together watertight at their edges, no matter how much care was exercised in making the attempt. In ore dressing such precision was not essential, and patentee Jensen evidently had only that use in mind. More or less crude mechanism was sufficient in the art of ore dressing.

Any seepage from the interior into the spaces between the lining and the wall of the cylinder would be disastrous, since appellant's machines are used for successive batches of different colors. One batch may be black, another white, a delicate yellow, green, or what not. The Jensen patent presents as many pockets for catching these different colors as there are cracks between the adjacent edges of the plates and spaces marked 21 between the lining and the wall of the cylinder, and unless every particle is washed out after treating one batch, before using it for a batch of different shade or color, contamination and discoloration would necessarily result since any accumulation of one color would gradually seep out and commingle with the succeeding color, which would condemn it and mean complete failure, and commercial efficiency too impossible to seriously consider. Appellant has manufactured these various machines in the past, and they could not be adapted in any way to the treatment of paint and ink pigments.

The tribunals of the Patent Office have cited this patent to show the gentle waviness of the interior of the Jensen mill. While it may well be true the patentee was the first to present this general idea, in doing so obviously he had in view only the one thought, namely that of ore dressing.

The fact is, if we refer to the Jensen specification, we at once see this:

(Page 1, line 9)

> "This invention relates to a lining for grinding mills, the object being to provide a lining which will impart a maximum amount of *agitation* to the mill contents, resulting in the efficient *grinding* thereof." (Italics ours.)

Appellant does not grind in the true sense, although the term is somewhat carelessly used by witnesses and in some of the letters from patrons (pp. 55 to 75, Record). *The material appellant treats is already ground, and it must* *be, before his process starts.* Furthermore, a close analysis of the foregoing paragraph and in fact the entire specification shows that patentee Jensen was looking for a maximum amount of *agitation* of the mill contents, whereas appellant's idea is not agitation but a gradual flowing movement with resultant dispersion of the material.

Incidentally, the term "dispersion" is recognized in the art as having a definite meaning and as distinguishing itself from mere grinding and agitation. By "disperse" is meant—

> "To place in a state of suspension, as finely divided particles in some other substance."
>
> See Webster's New Intertional Dictionary, Second Edition, 1935, p. 751.

It connotes a spreading out, a separation of fine particles, which are already very fine, obtaining a uniform consistency of all ingredients.

It is clear from the Jensen patent that patentee was considering a grinding action. Commencing line 14, page 1, of the patent we quote:

> "It has become well-known in the art to which my invention relates that the grinding action is due to the local motion and agitation of the grinding balls or cylpebs. This local movement of the balls or cylpebs causes the contents of the mill *to be ground therebetween.*" (Italics ours.)

Jensen undoubtedly had in mind control or prevention of any sliding action of the contents of the mill with reference to the lining plates, since he urges that such sliding action—

> " * * * causes excessive wear upon the lining plates, and prevents the local agitation and movement of the balls and cylpebs one with relation to the other, so that

> sliding in the grinding mill takes place at the expense of the lining plates and prevents the proper grinding of the mill contents." (Jensen, p. 1, commencing line 22.)

Then the patentee goes on to say:

> "In order to overcome this sliding of the mill contents, it has heretofore been customary to form the lining plates of various shapes and forms and to provide bars or ribs extending longitudinally of the mill. The lining plates were of a haphazard configuration, some being provided with steps, others with sharply slanting peaked sides, while others were of a waved configuration. Such haphazard configuration did not, however, as will be hereinafter more apparent, produce the maximum local movement of the balls or cylpebs, and consequently the maximum *grinding* action was not obtained." (P. 1, line 29.) (Italics ours.)

Later in his specification, after carefully describing the degree of the undulations in the plates, commencing with line 30, page 2, he goes on to state:

> "In order to cause the ingredients to break over, similar to the surf of the ocean waves, and in order to break up any particular formation within the mill, the adjacent trochoidal arcs, or more specifically the adjacent hypotrochoidal arcs, are formed from different generating circles, so that while they still are trochoidal in form they are of different wave lengths and amplitudes; thus the trochoidal arc A-B in Fig. 2 is of greater wave length and amplitude than the adjoining trochoidal arc B-X."

It would seem from the very suggestion of the surf of the ocean waves *breaking over* "in order to break up any particular formation within the mill" that patentee had in mind the creation of really a violent agitation that would probably be required in the treatment of ore which is granular and rough and when finally treated in one of these mills is coarse-grained, and it would seem to show not only that he had no idea of treating such substances as appellant treats, and he did not have the apparatus which would accomplish it. Besides the cracks between the overlapping edges of the lining plates, which it would be physically impossible to fit together with perfection, pockets are necessarily formed at the countersunk holes 16 in which the bolt-heads are held, in which fine particles gather and pack. As previously pointed out, any accumulation at any one or more of these points or cracks, or seepage into the spaces between the lining and the wall of the cylinder, would be absolutely fatal to the Cawood process because of the resulting contamination and discoloration of the dopes of varying color successively treated in his mill.

The foregoing objections are further accentuated by the modified construction shown in Jensen's sheet #2, R. 78, in which the cross-bars 29 and locking wedges 30 form the very abutments which Jensen himself condemns and which he seeks to avoid, as set forth in the opening paragraphs of his specification, see lines 29 to 34, page 1, of his specification. Consequently, the two constructions illustrated and described seem to be contradictory and to tend to negative each other, and to prove that Jensen not only could not have had any such treatment in view as appellant has, but certainly could not have adapted his mill to the accomplishment of appellant's results.

The Jensen creation based on the principle of the flow of the surf of the ocean, only went half-way. It may have served its purpose fifteen years ago, but he was considering a condition then existing, namely ore dressing, and not the treatment of paint and ink and pigments composed of much finer particles and presenting new problems and difficulties in their method of treatment. Seepage through crevices and settlement in pockets meant nothing to Jensen. They mean everything to appellant. Patentee was dealing with a single substance. Presumably his mill required no washing or rinsing. Appellant might not have been concerned either, if he could hope to sell a separate mill for the dispersion of each and every color. Appellant thought much further than that. His machine must be capable of dealing with all colors without discoloration or contamination. Thus his mill must be as clean as a glass milk tank for each new batch involving a change of shade or color. *In short, it must be universal.* And that is precisely what manufacturers, as evidenced by their letters, have acknowledged it to be.

It seems obvious that both the Patent Office and the trial court completely lost sight of the real point of contention in this case as pertains to the appropriateness of the Jensen machine and its adaptability to the grinding of paint products.

It seems obvious as we have previously pointed out, and which should again be stressed in this Brief, namely the fact that the liners 12 are separate from the shell 11 of the mill and are bolted in place makes the mill utterly unsuited for the grinding of colored pigments because after one color is ground, it would be impossible to grind another color without tearing down the entire machine, removing every single plate, and thoroughly cleaning it, because any pigments of one color which were left in the machine would ooze out and destroy the next color ground.

Bolts are used to hold this type of lining in place, and even if one were willing to put up with the disadvantages pointed out, and which in itself would surely prohibit the use of the Jensen mill for paint grinding purposes, some means would have to be found to place a packing gland of some kind around each bolt as the liquid paint would ooze out of the mill between the bolts and the bolt holes, not to speak of accumulation of material in the pockets formed above the bolts.

While the surface of the liner plates are curved, this curvatûre faintly resembling that of the streamlined enlargements in appellant's mill, now it is submitted that both the Patent Office and the Court completely lost sight of the fact, and appellant may have failed to call attention to this fact, namely that these curved plates are held in place in one form of the Jensen mill, (namely that shown in Fig. 5) by a square edged lifter bar 29, which brings us right back to the old-style mill that was commonly used in ore dressing before the Cawood mill was invented. To make matters worse, the curvature on the liner plates of the Jensen mill is such that the balls are pitched down directly against the sharp corners of these lifter-bars, so that the Jensen mill is even worse than the old-style mill, for it not only has the square edged lifter-bars, but also it has a means of pitching the balls down toward this square-edged bar, with the result that the lifter-bar will be greatly abraded or eroded by the impact of the balls.

Furthermore, as a modification is in effect an equivalent, the form of construction disclosed in Fig. 5 of the Jensen patent would seem to be in contravention of the very theory upon which the Jensen invention was founded. Finally, anyone familiar with the metal working art would know that it would be utterly impossible to cast the plates used in the Jensen patent so that they would fit accurately and closely. It would even be impossible to machine them so that the surfaces would form a sufficiently close contact to be fluid-tight. Also there would of course be warping. It would be absolutely impossible to make this lining tight without packing every single joint between plates, and the movement within the mill would even then prevent this joint from being tight. Since this invention is not on the market, we believe we are within our rights in asserting that the Jensen patent is a mere paper patent.

(b) British Patent, Everitt, No. 105,614.

The patent to Everitt, No. 105,614, is brief and leaves plenty to conjecture, and yet there is enough in it to fully establish the fact that patentee was dealing with certain substances and conditions and had in view certain objectives which were manifestly different from appellant's. Everitt, perhaps at first glance, would look close, but his results and accomplishments (if he had ever tried it) would be totally different in dealing with the problem which appellant solved. Both the drawings and description of Everitt—as meagre as the description is—show clearly that by following the teachings of this patent the results would be altogether different from appellant's and a commercial failure.

In fact appellant's problem did not exist twenty-five years ago since the art of manufacturing paints and inks has vastly improved in that time, and it is safe to say the dispersion of pigments had never been tried, and no effort had been made to adapt a ball mill to accomplish such a result as far back as 1916.

Referring to the specification and claim of the Everitt patent, twice we find the following expression:

"To increase the play of the balls."

Beyond this, patentee is silent except as to what can be gathered from the drawings.

That, however, was not the real gist of the Everitt improvement. What Everitt was after was an abrupt obstruction *to increase the play of the balls.* While he does not define what he means by *play,* taken with the drawings and the general connotation of the word *play,* he undoubtedly had in mind liberty of action, freedom of motion, lack of restraint, like children at play. The word *play* suggests all this.

We know that these ribs 17 produce temporary obstructions in Everitt's design and present objectionable angles at the base of the ribs 17 where they join the wall of the cylinder. The effect of these appellant has sought to illustrate in the photograph, R. 72, wherein there is an accumulation of material shown in the angle between the rib and the adjoining surface of the cylinder (see Figs. 1 and 2 of this picture). In the Everitt patent, the curvatures at the base of the ribs 17 is quite acute and the walls of the ribs are abrupt, and they have the very effect which appellant must avoid to obtain success, namely of causing an abrupt impact against and stoppage of the balls upon the ribs, followed by a jumping or leaping thereover with a hammer blow on the other side of the ribs instead of a steady, progressive rolling with constant contact over the surface of the wall of the cylinder and the enlargements, *with just sufficient slight retardation without obstruction to prevent the sliding of the contents of the cylinder,* and the play or jumping of the balls.

In the Everitt patent, the tops of these bars are convex and faintly resemble in that respect the bars used in the Cawood mill, but the bottom of the bars are not properly concaved to insure the easy rolling of the balls over the convex section of the bars, hence the interior is not completely streamlined as it is in the Cawood mill. In practice appellant has demonstrated that this has a tendency to stop the balls, creating considerable abrasion on the bars, and it is a proven fact that this type of bar is worn away at least 100% more rapidly than is the case with the streamlined enlargements in the Cawood mill.

Another thing which was clearly demonstrated to the Court and which the different tribunals seem to have utterly overlooked is the fact that the absence of streamlining in the base of the lifter bars in the Everitt mill locks the balls as the mill revolves piling up many layers of balls above the bars. Movement of the balls is actually prevented by locking as the balls are not permitted to travel smoothly up what amounts to, in the Cawood mill, an inclined plane but which, in the Everitt mill, is a precipitous, almost vertical, wall.

Certainly the structure defined by appellant's claims is not anticipated in any way by Everitt and the Court's contention that, insofar as the action of the mill is concerned, there is no difference in the integral construction of the lined structure of Everitt, is entirely without basis in fact, the difference being that the Everitt mill could not possibly be used successfully for the grinding of paint whereby, by several hundred mills already in use, the practicability of the Cawood mill has been amply demonstrated.

Review of Testimony.

(a) Witness Richard L. Cawood.

At the trial of this case in the District Court there were three witnesses. Mr. Cawood testified he had been manufacturing ball-mills for approximately forty years, and that his company, The Patterson Foundry & Machine Company, is perhaps the largest manufacturers today of ball-mills as used for the finer types of grinding, and that it constitutes a very large proportion of their business. (R. 19, 20.) He further explained—

> "The types which we now manufacture are used for fine grinding and particularly for the production of printing inks, rotogravure inks, paints, lacquers, food products, cosmetics, and all fine products of that type." (R. 20.)

He then stated that he was the first to develop these mills for the treatment of paints and inks, and that he was approximately twelve years in developing this present invention. (R. 20.)

He then proceeded to give the history of the development of this type of machine in order to get rid of that (referring to the grooving of the shell in the smooth cylinder)—

> "* * * we put into the mill lifter bars. That is, lifter bars were first bolted in and were later welded in. But I found that the abrading action of those balls against the bars eroded the bars and also caused considerable wear on the balls, with the metallic contamination entering the product. * * * Then, after some eight or nine years of experimentation I finally developed the machine for which this application was filed and which is streamlined on the inside.
>
> "In order to maintain good cataracting and lengthwise movement of the balls in the mill, I developed the streamlined bulbous sections which are now an integral part of the shell, streamlining the bulbous sections as well as the shell of the mill into the heads, so that there were no sharp corners, no crevices left; so that all lines flowed smoothly into the others." (R. 21, 22.)

Just preceding this, witness said:

> "I came to the idea of using the ball mill, so called in place of the pebble mill, and I knew that it could have

> no joints in it, first, because the balls would erode these joints, and second because if the lining were bolted together in any way, the unground material would lodge in those sections and then become dislodged about the time a batch was finished.
>
> I knew also that in the grinding of liquid paint, the pigments in the vehicle would leak in back of these linings and would then come out again and destroy the color. Also, I knew it would be practically impossible to change colors." (R. 21.)

By "changing colors" it was explained that after treating a batch of one color, by simply washing out the mill a batch of a very different color might be, and commonly is, treated.

Referring to Jensen, witness said:

> "If I may be permitted to refer to the Jensen patent first, it consists of a section or of a series of sections of lining bolted or otherwise held in place against the shaft, which construction in itself makes it impractical —I might even say impossible—to use in the grinding of paints, or anything of that nature; first, on account of the erosion at the joints; second, because the liquids or vehicles carrying the pigments would seep in back of the lining and would come out again either later in that batch or in another batch. You can easily see how, if you were grinding brown in one batch and then attempted to grind blue in the next, you would have an intermingling of the colors that would utterly destroy the value of the second batch ground.
>
> * * * * *
>
> Also, in Fig. 5 of the Jensen patent it will be noted that these liners are held in place with bars, and the balls would abrade these bars and erode from them sufficient metallic contamination to destroy the color, incidentally, the value of the batch being ground." (R. 23, 24.)

In analyzing Everitt, Mr. Cawood dwells upon the fact that:

> "* * * bars of this type increase the action of the balls within the mill, which is a very necessary thing in mills that are used for ore dressing or for coarse grinding—in other words, mills in which we depend upon impact between the balls to do the crushing of the materials—and lifter bars of the type shown raise the balls to a high point for cataracting, and we get a jumping of the balls over these bars * * *.
>
> This quality, while being of importance in ore dressing and for coarse grinding, is a decided disadvantage in the so-called grinding, or, more properly speaking, dispersion of paint products, and the like.
>
> In paint products to-day, as well as in most materials of that kind, we really do no grinding. Primarily we do wetting. That is, we wet every single particle with the vehicle of the pigments which are already fine enough for the purpose. In other words, we thoroughly and uniformly disperse the pigments in the vehicles.
>
> IN THIS CASE WE MUST NOT HAVE HIGH CATARACTING, WE MUST NOT HAVE IMPACT, WE MUST NOT HAVE STOPPAGE OF THE GRINDING MEDIA AGAINST THE LIFTER BARS, BECAUSE THE CREATION OF JUMPING OR OF IMPACT ACTION MEANS THAT WE GET CONTAMINATION FROM THE HARSH CONTACT OF THE BALLS AGAINST THE LIFTER BARS AS WELL AS FROM THE BALLS THEMSELVES. (R. 24, 25.) (Emphasis ours).

> "It will be noted in Fig. 5 of the Jensen patent, and also in Fig. 2 of the Everitt patent, that there is no ease or sloping approach to the lifter bars; consequently the balls hit these bars and stop, thereby abrading them. The balls are also carried to too great a height for rotating action, and impact action occurs.
>
> If you will contrast this with the section that I have here (shows a small model) from the mill covered by our application, you will see the difference in shape. These balls, instead of coming to that point, jumping up, and retarding others, causing a locking of several rows of balls over it, actually roll gently over this hill.

> I might demonstrate that, if I may, in a little better pictorial manner by comparing the gliding of these balls over that mill to skiers gliding over this rise." (R. 25.)

Appellant at this point further demonstrated by two bottles of material treated in the Cawood and Everitt mills showing contamination in one sample and lack of it in the other.

Mr. Cawood has testified to the growth of this branch of his business, the number of sales made, the value of those sales, the large number of mills used by the largest manufacturers of paint and ink in the country. He testified that approximately five hundred of these machines have been sold to date, with a value in excess of $1,000,000, and that there are 405 of them in actual production to-day distributed pretty well over the industry.

> "We also have quite a number in operation grinding inks, that is, rotogravure, intaglio, news inks, and colors. For instance, all of the ink used to-day in the Chicago Tribune, in both their rotogravure and their comic sections, is all ground in those machines. The Intag Corporation, of Chicago, is also grinding all colors from white to black with these machines. They have thirteen of them. The Cook Paint & Varnish Company have sixteen. The Pittsburgh Plate Glass Company has twenty-three in operation. The Sherwin-Williams Company has forty-one in operation and thirty more on order." (R. 28.)

A very interesting point was brought out in Mr. Cawood's testimony in regard to lenses. He was asked, "What about lenses? Is not talcum powder used for lenses?" His answer was:

> "No. The first machine of this type that I ever built was for the Bausch & Lomb Company, for whom I have

run a lot of experiments on the grinding of rouge for lens grinding. It took me about two years to finally get the machine so that it would grind rouge sufficiently fine and smooth for lens polishing without contamination and without iron particles in it. That was the first machine that was placed in successful operation.

Q. Do they use that on some of these lenses of astronomical size?

A. Yes, they do. The 100-inch lens at the Wilson Observatory was originally scratched very badly on account of defective rouge and was later corrected by the use of a rouge that was properly ground.

Q. By your mills? A. Yes, I might say that the larger manufacturers of carbon paper coating to-day are using these mills almost exclusively for that purpose.

These letters, I believe, have been placed in evidence.

Q. They will be placed in evidence. * * *" (R. 29.)

The letters referred to in these last answers are to be found in the Record, pages 55 to 75, from manufacturers of paints and inks in various parts of the country; and on pages 51 to 54 is a partial list of some of the plants using these mills. At the conclusion of this list, which was prepared and furnished during the prosecution of the case before the Primary Examiner, your Honors' attention is especially called to the last three paragraphs, p. 54, merely to give an idea of the commercial resistance which existed, and which was met by appellant in the production and sale of this mill.

On cross-examination, witness Cawood was asked about the different materials used in the construction of mills and balls, and he explained the earlier mills were made of ordinary open-hearth steel, but that the ones of later manufacture were of chrome-manganese steel, which he testified is very hard, wear-resisting material (R. 30).

(b) Witness Herbert H. Harnden.

Witness Harnden, who is general superintendent of the Ault & Wyborg Division of the Interchemical Corporation, New York, N. Y., gives a brief historical sketch of different types of mills which had been used for the dispersion of paint and ink pigments. This witness brought out the fact that they are always in the market for a better mill when that will cut their grinding time.

> "The cost of manufacturing paints is nearly entirely involved around the grinding procedure; the rest of the work is more or less a case of man power * * * So, our costs are based primarily on the length of time it takes to grind the paste." (R. 33.)

He was asked if he was able to reduce that time now with greater economy. He answered,

> "Well, in connection with that, you have vehicles to consider, but the general action of the mill now does not heat up as fast as it used to because of a more smooth flowing of that steel.
>
> When those ball mills used to run five or six years, you could hear them bang, bang, bang against the shell. Now you just hear a gentle murmur when that mill is running, which indicates that there is not much of an impact.
>
> Another thing: We found that we didn't use—we didn't have to replace the steel balls as often. The fact of the matter is, I believe, that we have the reputation of buying less steel balls than anybody else in the manufacture of paint. * * * we find that contamination of our products now is very much reduced over the old method, particularly when we use the steel-lined mill.
>
> Q. So, you are now able to make almost any color?
>
> A. Oh, yes, we are sold on the idea now that we can make any color within reason." (R. 32, 33.)

On cross-examination, this witness was asked if he had stepped up the time with the steel ball mill? His answer was:

> "Oh, yes. What we liked particularly—the difference between the buhrstone—I am talking about the stone mills * * * and the steel ball mill is that we don't have to have supervision. You have to have a man watching a tandem-stone mill all the time in order to keep the paint feeding through it properly, so that you don't burn up the product, while in the steel ball mill you put your whole charge in.
>
> We work on a ratio of using three parts of steel ball to one part of paste we are trying to grind. We try to set this up as standard procedure. If we prescribe a formula to grind forty-eight hours in a steel ball mill, we can duplicate that grind identically, using the same ball ratio between the balls and the paste we are trying to grind.
>
> Now, if we increase that charge to 4 to 1, we grind faster; if we reduce that charge to 2 to 1, we grind slower. In other words, the grinding time is entirely contingent on the number of steel balls in relation to the paste you are trying to grind.
>
> * * * * *
>
> Q. Is there an advantage or is there a difference in the rubbing or pounding effect in this Cawood construction with the streamlined enlargements over the abrupt ones in that respect?
>
> A. *Well, in the first place, it destroys the balls, and you get much greater abrasion that way, and you also increase the heat of the mill by that steel pounding on the other steel balls and on the shell.* (Italics ours.) (R. 34, 35).

Mr. Mackey asked witness Harnden (R. 34):

> "Q. At least a part of the new utility of this mill is due to the fact that it is made of very hard material, is it not?
>
> A. As I said before, I think that is a collaboration idea, but I think a lot can be attributed to the smooth flowing steel ball."

Witness amplified the foregoing in the seven or eight succeeding answers (R. 34, 35).

This was all based on part of his answer on direct examination (pages 32 and 33):

> "Then, as I say, they developed this hard, chrome manganese shell and the balls and we were able gradually to step up the different colored pigments, up to the point now where we can grind ultramarine blue, which is a rather translucent color and discolors very easily; *et sequor.*" (R. 32.)

In connection with the Harnden testimony, attention is respectfully called to a letter written by Ault & Wyborg Corporation, signed by Mr. Harnden, to The Patterson & Machine Company, February 10, 1938. (R. 66.)

(c) Witness David E. Eichelberger.

Witness Eichelberger, who is general superintendent of the Cook Paint & Varnish Company, Detroit plant, was asked if he had noticed any distinction between the Cawood present construction and those constructions that may have been used in the past for the same purpose. His answer was, "Definitely so." (R. 36.) He was then asked:

> "In what way do they differ in results? A. We secure shorter grinding time and much less contamination. In the old mill we were not able to grind light colors. In the new mills we are able to grind any light colors up to just off white." (R. 36.)

This witness testified that they have a total of sixteen of these mills in their Detroit and Kansas City plants. Asked if he had found any difference in the results in the heating and wasting of material, destruction of balls, etc., his answer was:

> "Yes, we do. We have had several, or I would say numerous, comparisons. We, as are all other paint manufacturers, are interested in cutting our grinding time down, which represents a large part of our cost. We have some of the old type with lifter bars and soft

> shells, and we have the new type, with hard shell and the wave-like bar. In addition to that, just to make a comparison and satisfy ourselves—we usually take the manufacturer's word for it, not only in ball-mills, centrifuges, clarifiers, pigments, etc. but we conduct our own tests. In other words, they can tell us, but we have got to prove it to ourselves." (R. 36.)

He then testified as to some very interesting tests in which different constructions of mills were employed, testifying to trying out square lifter-bars among other things, which he classified under three types. (R. 37.)

> "The old soft shell took us about a third longer to grind with lots of contamination. The one in which we put the hard shell with the square bars we were able to reduce the time not quite as much, but after a year's operation these lifter bars had been hit on the corners. We still got a lot of steel, not as much, but the balls did not wear round; whereas in the new mill, with your hard shell and the wave-type bars, the balls were perfectly round. It took us less time to grind, and we had practically no steel whatsoever.
>
> Our comparison on a batch ran about like this: On the old soft shell with the old type bars, about 72 hours, with lots of steel.
>
> In the mill we remodeled, with hard shell and the square bars, we could grind it in about 66 hours with less steel but with entirely too much.
>
> In the other mill the new ball mill, we would grind in about 48 hours, and we could detect practically no steel at all, and the balls wore round, whereas in the others they wore oblong shaped."

Later, on cross-examination, the witness explained that the corners of these bars instead of being sharp were welded on to the edge, so that they could be as round as they could make them.

> "That was also of hard steel. It wasn't sharp, though *it wasn't a complete curve.*" (Italics ours—R. 37.)

Witness Eichelberger also referred to replacing the lining of "old soft shelled mills" with "hard chrome manganese shell" (R. 36) and the results (middle R. 37). Asked if he thought "the improvement is essentially in the particular material used", he answered,

> "Well, I think it is a collaboration of ideas." (R. 33.)

When on re-direct examination, the witness was shown a copy of the Everitt patent, he explained he was not familiar with it, but on looking at it he testified that the shape of the bars as shown in the Everitt patent compared quite favorably with the so-called square bars with welded rounded edges which they had employed.

On re-cross, in answer to a further question on this subject, witness said:

> "Well, I would say not rounded quite as much, but they were definitely round. They were not square, hard corners." (R. 38.)

Witness explained welding material previously referred to was very hard. It was equally as hard as the bar itself. (R. 38.)

As pointed out, witnesses Harnden and Eichelberger elaborated on the materials employed for the mills and balls, and as Mr. Harnden said the choice of material was a matter of collaboration of ideas. (R. 33, 34, top of each page.) Some of the letters (R. 55 to 75) refer to these distinctions in material, and while this, obviously, is of minor importance, it seems very evident that in the process of experiments over a period of ten years, testified to by Mr. Cawood, he undoubtedly tested out all available material to determine what would give the best and most enduring results. But the fundamental conception was the *smooth streamlined undulations* to prevent abrasion, discoloration, and contamination, and preclude seepage, and resultant accumulations of material which, if there, would necessarily commingle with successive batches under treatment.

Decision of the Several Tribunals.

Referring briefly to the Examiner's Statement (R. 85 to 89) it will be seen that in his discussion, more particularly of claims 4 to 10, the Examiner based his decision on patent to Everitt *in view of Jensen;* in other words, as seems too common, supplementing the deficiency of one patent by another, even though neither patentee had in view appellant's thought or construction to carry that conception into practical commercial effect, or the treatment of a special product, such as appellant had in view and solved in a practical and forthright manner to the satisfaction of innumerable customers. (See R. 51 to 75.)

The attention of the Court is particularly asked to the three concluding lines of the Examiner's Answer (R. 88, 89):

> "It does not appear that applicant has combined in the structure of the shell any of these features *to produce any new result.*" (Italics ours.)

BUT THAT IS PRECISELY WHAT APPELLANT DID GET, NAMELY A NEW RESULT.

Decision of Board of Appeals.

Coming now to the decision of the Board of Appeals of the Patent Office (R. 89 to 92) first it will be noted appellant only urged for the allowance of claims 4, 8, 9 and 10 at the hearing before the Board. On page 90 of the record, the Board discusses the two references which we have previously discussed in this Brief, and says:

> "However, Everitt discloses a structure in which the ridges are formed integrally with the shell rather than of separate curved sheets as in Jensen."

but while the Board held that the terms of claims 4, 8, 9 and 10 may be read upon each of Jensen and Everitt nevertheless, the Board, like the Examiner, combined these two patents in an effort to anticipate the claims appealed, concluding with the following:

> "We consider it is within the rights of the public to give the interior formation of Everitt's integral ridges the same as that shown for Jensen's ridges particularly since Jensen discloses fully the theory of action of this type of ridge." (R. 91, 92.)

In the discussion of the Jensen patent (R. 90), the Board of Appeals entirely ignored the objectionable cracks, crevices, pockets, and large spaces which it has been pointed out are most objectionable and deleterious to the dispersion of fine substances in different colors of batches. Mr. Cawood testified while he had manufactured the Jensen mill as well as the Everitt mill, the Jensen mill is not on the market. It is a "has been". It would be impossible to employ such a mill in the treatment of the dope which we now have to consider. It is very evident from the construction that Jensen did not have in view the treatment of any such material or he would have known at once that his mill would be an utter failure, in fact the very idea of it condemns it for the purposes under discussion. True, Jensen had the idea of the wave motion and in theory prevention or lessening of the tendency to slide instead of rolling, but beyond that Jensen did not go, and obviously did not even think, and it is fair to assume he did not have the same problem before him which Mr. Cawood had and so successfully solved. Consequently, should such a patent stand in the way of appellant's specially designed and up-to-date invention? Should it stand as an obstruction to this salutary development in the art? If the answer be "Yes", it means stagnation of the art.

With due respect to the Examiner's Answer, the decision of the Board of Appeals of the Patent Office, and of Mr. Justice Bailey, before whom the case was tried, it is submitted that none of these tribunals have been able to take a realistic view of this question. Their experience and theoretical knowledge and view-point are not questioned, but we do believe, if one thing stands out more clearly than any other, in these concurrent decisions, it is that there has been shown a lack of appreciation of the necessary refinements and adaptation of a well-known ball-mill used in the grinding of ore to the treatment of an entirely different type and quality of material employed differently and in a totally different art, and a failure to recognize the fact that any of the patents of the prior art could successfully perform the functions and produce the results required in the treatment of paint and ink pigments and kindred products any more than a trip-hammer could be used to drive a carpet-tack.

That the various concurrent decisions were in substantial agreement *does not prove that they did not all fall into the same error of judgment.* We submit that that is hardly a criterion for affirmance in this case. We believe appellant has made out a strong case of utility and demand and the commercial supply of a long-felt want, all of which has resulted from the attainment of a new result.

As we have hitherto indicated in this Brief, it was suggested in Examiner's Answer *that no new result was produced.* (R. 88, 89.) Quite the contrary has been proven beyond peradvanture. It has been conclusively proven that *the invention has produced a new result.* The results of the invention are the successful and superior treatment of a wide range of colors and materials at reduced cost, and a reduction in time required with machines which are more durable than heretofore for like purposes, and which machines generate less heat, require less repair and less individual attention. In short, appellant has appreciably advanced the art, and it was not the accomplishment of a day or a week or a month, but the consummation of industrious and studious work of years of trial and experimentation.

It is inventions like these which improve and perfect the arts. In the rapid march of science and industry new problems arise. They are just as difficult to solve as were the problems of the past. They require intensive study, trial and error. They may result in readaptation and elimination of fundamental concepts, and their perfection and reorganization to master the situation in hand may require as much care, study and downright inventive genius as in a pioneer invention. The instant invention is of demonstrated success and value. Years elapsed between the dates of the two patents cited and this invention. The art seemingly was completed so far as the requirements of that time. No doubt the then machines served their purpose. But in the process of time new conditions have arisen, new materials required treatment with new results. Such was the accomplishment of appellant. After persevering and unrelenting pursuit of the subject, he won, and the commercial world has recognized and applauded his unremitting efforts. It is believed few cases present such a history of effort and commercial achievement.

Respectfully submitted,

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Appendix

CITATIONS.

Years of Experimentation.

"In view of the fact that previous attempts, of which there appear to have been several, to make a practical canvas belt had been failures, and that Gandy had been experimenting with the subject for several years before he discovered that a change was necessary in the structure of the canvas itself, we do not think his improvement is a change in degree only, or such an one as would have occurred to an ordinary mechanic, and our opinion is that it does involve an exercise of the inventive faculty. The change is such as would only have occurred to one familiar, not alone with the impossibility of making a practical belt out of the ordinary canvas, but to one who has bestowed considerable thought upon the method of overcoming the difficulty."

Gandy v. Main, 143 U. S. 587, 12 S. Ct. 598, 36 L. Ed. 272 (1891).

"But the vital thought of using a *reciprocating* engine (of the Westinghouse type) which through one rack bar accomplished the driving of both screws was new. The solution was simple, when discovered, but had not before been obvious to the skilled mechanic, as evidenced not only by Lower's frequent experiments before the desired result was accomplished, but also the pronounced success of the device and (after its successful use by Lower) its adoption by Hanna, the active competitor of Lower, who had before rejected or abandoned the idea of a reciprocating engine for a two-cylinder engine."

Locomotive Stoker Co. v. Hanna Stoker Co., 18 F. (2d) 257, C. C. A. 6.

"* * * So, also, is it regarded as significant that there has been a recognized need for such a machine, and that the efforts of others to meet it have been without success, which the inventor has attained only after continued experiment."

American Caramel Co. v. Thomas Mills & Bro., 149 F. 743, C. C. A. 3.

In the case of *Thornton v. Coe,* 501 O. G. 3; 102 Fed. (2d) 247; 41 U. S. P. Q. 85; 1939 C. D. pages 23-33, this honorable court reversed the decision of the District Court of the United States for the District of Columbia. The subject-matter was a warp-beam, and in the decision it was pointed out that for at least eight years prior to the introduction of Thornton's device into the art, warper beams were subject to the defect of spreading of the heads, as well as other defects and deficiencies which the Thornton warp beam corrected, and in consequence became a distinct success. The Court speaking through Mr. Justice Stephens went on to say:

> "Thornton accomplished not merely a disk successfully resistant to yarn pressure, but also one successfully adjustable to variations in pressure. To this accomplishment the Board of Appeals and the Commissioner give no weight, indeed no mention. This adjustability is, we think, not suggested in any obvious way by any of the references, much less accomplished by them. The adjustability of Thornton's device is clearly highly useful with respect of variations in yarns and weight pressures and the commercial success of this device is amply established. We think that Thornton's accomplishment of adjustability is such that it cannot be said that want of invention is clear, and we may, therefore, properly resort to utility and commercial success to remove any remaining doubt."

The Court then went on to mention the lapse of eight years between the issuance of the prior patent to Peterson before Thornton solved the problem with the adjustable disk, and that Thornton's improvement was a distinct success and consequently this is highly persuasive of invention.

In the case of *Carbide and Carbon Chem. Corp. v. Coe,* decided Dec. 29, 1938; 501 O. G. 7; 102 Fed. (2d) 236; 1939

C. D. 33, this court quoting from Kirsch Manufacturing Co. v. Gould Mersereau, 6 Fed. (2d) 793, said:

> "An invention as Judge Learned Hand has said is 'a new display of ingenuity beyond the compass of the routineer.' The line is between 'what seems an easy step and what does not.' "

In a recent decision, *Gillman et al. v. Stern et al.,* 114 Fed. (2d) 29, 30, Judge Learned Hand in the course of his decision said:

> "The first attack upon the patent is that it was merely for a new use of an old device. However, the only objection to patenting a new use is that the statute * * * does not include 'uses' among what can be patented, except so far as they are included within 'arts'—*i. e.* processes. If, however, an old article must be physically changed, even slightly, to fit the new use, it becomes itself a new 'machine' or 'manufacture', and the statute is satisfied. In that case the only question open is whether the discovery of the new use demands enough original thought to be deemed an invention. Constitutionally only 'discoveries' can be patented at all, and the ingenuity needed for the new conception, not the amount of physical readjustment, is the test of a valuable 'discovery.'
>
> * * * * *
>
> However, this modification of the old devices we need not count in holding that Wenczel made an invention; it was because he selected for an old need—quilting—a theretofore unused device that we think he showed more than ordinary insight, else it would have been made before."

In *Lawther v. Hamilton,* 124 U. S. 1, 8 S. Ct. 342; 31 L. Ed. 325, Mr. Justice Bradley said:

> "Why should it be doubted that such a discovery is patentable? It is highly useful, and it is shown by the evidence to have been the result of careful and long-continued experiments and the application of much ingenuity."

In that case, the question involved an improvement in a process. The machinery used by Lawther had all been used before, but patentee discovered that by altogether omitting one of the steps of the former process—the grinding and mixing under the muller-tones—and mixing in the mixing machine by means of steam, a great improvement was effected in the result.

New and Useful Results.

> "* * * Indeed, this use of the connecting mechanism can hardly be termed analogous to such as similar mechanisms had been previously used for; but even if it were, the results are so important, and the ingenuity displayed to bring them about is such that we are not disposed to deny the patentees the merit of invention. The combination described in the first claim was clearly new."
>
> *National v. Boston,* 156 U. S. 502, 15 S. Ct. 434, 39 L. Ed. 511.
>
> "Indeed, it often requires as acute a perception of the relation between cause and effect, and as much of the peculiar intuitive genius which is a characteristic of great inventors, to grasp the idea that a device used in one art may be made available in another, as would be necessary to create the device *de novo.* And this is not the less true, if, after the thing has been done, it appears to the ordinary mind so simple as to excite wonder that it was not thought of before. The apparent simplicity of a new device often leads an inexperienced person to think that it would have occurred to any one familiar with the subject; but the decisive answer is that with dozens and perhaps hundreds of others laboring in the same field it had never occurred to any one before."
>
> *Potts v. Creager,* 155 U. S. 597, 15 S. Ct. 194, 39 L. Ed. 275.
>
> "But where there is some such new and useful result, where a machine has acquired new functions and

useful properties, it may be patentable as an invention, though the only change made in the machine has been supplanting one of its materials by another * * * So in the present case the use, in the manner described, of hard rubber in lieu of the materials previously used for a plate produced a manufacture long sought but never before obtained,—a set of artificial teeth, light and elastic, easily adapted to the contour of the mouth, flexible, yet firm and strong, consisting of one piece, with no crevices between the teeth and the plate, impervious to the fluids of the mouth, unaffected by the chemical action to which artificial teeth and plates are subjected when in place, clean and healthy—peculiarities which distinguish it from everything that had preceded it. These differences, in our opinion, are too many and too great to be ascribed to mere mechanical skill. They may justly be regarded as the results of inventive effort, and as making the manufacture of which they are attributes a novel thing in kind, and consequently patentable as such."

Smith v. Goodyear Dental Vulcanite Co. et al., 93 U. S. 486, 23 L. Ed. 952 (1876).

"* * * To change the form of an existing machine, and by means of such change to introduce an employ other mechanical principles or natural powers, or, as it is termed, a new mode of operation, and thus attain a new and useful result, is the subject of a patent. Such is the basis on which the plaintiff's patent rests."

Winans v. Denmead et al., 15 How. 330, 14 L. Ed. 717.

"The combination of old and well-known elements so as to produce a useful machine which is new is patentable."

Wicke v. Ostrum, 103 U. S. 461; 26 L. Ed. 409.

"A combination is patentable only when the essential elements of which it is composed produce by their joint action a new and useful result, or an old result in a cheaper or otherwise more advantageous way."

Stephenson v. Brooklyn, 114 U. S. 149; 29 L. Ed. 58; 5 S. Ct. 777.

"The combination must be new, and if productive of new and useful results and not a mere aggregation of results it might be the subject of a patent, though all the parts were used before."

Dane v. Chicago, 131 U. S. cxxvi app.; 23 L. Ed. 82.

"The mere fact that the patented invention is but a combination of old ingredients or materials is not a tenable objection to the patent, since it is a general rule that a patentable invention may consist entirely in a new combination or arrangement, provided a new and useful result is thereby attained."

Thomson v. Citizens Nat'l Bk., 53 Fed. 250; 3 C. C. A. 518.

"But the mere fact that the patentee's invention is but the combination of old ingredients or materials is no answer to the patent, for it is a general rule that a patentable invention may consist entirely in a new combination or arrangement of old or well-known ingredients or elements, provided a new and useful result is thereby attained."

Griswold v. Harker, 62 Fed. 389; 10 C. C. A. 435.

(Based on Thomson v. Citizens Bank.)

See also:

Murphy v. Excelsior, 76 Fed. 965; 22 C. C. A. 658.

Cimiotti v. American, 115 Fed. 498; 53 C. C. A. 230.

"It is not of consequence that the elements of each claim may be old, for the claims are for a combination, and if the combination be new, or if by a new mode of organization new or better results are obtained, the patent may be sustained."

Dunn v. Standard, 163 Fed. 521.

In the case of Brown v. Crane Company, 133 F. 235, (C. C. A. 7), in deciding the case, Judge Baker said:

> "* * * as I look at it the life germ of any creation is not so much the mechanical form in which it finally becomes embodied, as the flash of inspiration that, out of the darkness in which it lay concealed, first revealed its possibility. The possibility of a thing once seen, it is

> of no great moment that a ready mechanical means of bringing it into form is at hand; nor that the mechanical means used are similar to those employed before in the allied arts; nor that any mind would have seen the adaptability, mechanically, of what already existed to what was now, for the first time, about to exist. The true inquiry is: Did any one before in creative imagination, actually see this new thing? Did it not require invention to discern, in the first instance, that the new thing was possible? Is it not invention to bring out of what to others seems chaos the form and feasibility of the new and useful thing?
>
> Invention is not, in my judgment, confined to the concrete mechanical form into which an idea ultimately evolves. Invention is the idea itself, the burst of new thought, the discovery; and patentable invention is the conjunction of these with appropriate and efficient mechanical means. Confessedly, an old idea, carried out mechanically in a new form, is patentable invention. To my mind a new idea, carried out mechanically in an old form, ought equally be regarded as patentable invention. To hold otherwise is to dethrone the head and enthrone the hands—to leave genuine genius unrecompensed, while placing the inventor's crown on mechanical skill."

In Seymour v. Osborne, 11 Wall. 516, 20 L. Ed. 33 (1870) Mr. Justice Clifford of the Supreme Court held that:

> "Such a change in an old machine may consist merely of a new and useful combination of the several parts of which the old machine is composed, or it may consist of a material alteration or modification of one or more of the several devices which entered into its construction, and whether it be the one of the other, if the change of construction and operation actually adapt the machine to a new and valuable use unknown before, and it actually produces a new and useful result, then a patent may be granted for the same and it will be upheld as a patentable improvement."

In the Barbed Wire patent case, 143 U. S. 275; 12 S. Ct. 443; 36 L. Ed. 154, the Supreme Court held, speaking through Mr. Justice Brown, that,

> "Under such circumstances courts have not been reluctant to sustain a patent to the man who has taken the final step which has turned a failure into a success. In the light of patents it is the last step that wins. It may be strange that, considering the improved results obtained by Kelly in his patent, it did not occur to him to substitute a coiled wire in place of the diamond-shaped prong, but evidently it did not; and to the man to whom it did, ought not be denied the quality of inventor. There are many instances in the reported decisions of this court where a monopoly has been sustained in favor of the last of a series of inventors, all of whom were groping to attain a certain result, which only the last one of the number seemed able to grasp.
> * * * It may be laid down as a general rule, although perhaps not an invariable one, that if a new combination and arrangement of known elements produce a new and beneficial result, never attained before, it is evidence of invention."

In Welsbach Incandescent Gas Light Co. v. New Incandescent Gas Lighting Co., (1900) 1 Ch. 843; 69 L. J. Ch. 343; 2 L. T. 293; 17 R. P. C. 237, the Court said:

> "A very small amount of utility is sufficient to support a patent. Utility, in patent law, does not mean abstract, or comparative, or competitive, or commercial utility, but, as applied to an invention, it means that the invention is better than the preceding knowledge of the trade as to a particular fabric, better that is in some respect though not necessarily in every respect * * *. An invention is useful when the public are thereby enabled to do something which they could not do before, or to do in a more advantageous manner something which they could do before, or in other words, an invention is patentable which offers the public a useful choice."

Turning Failure into Success.

"It is true that many valuable inventions seem simple when accomplished, and yet are entitled to protection. The books abound in cases showing inventions involving only small departure from former means, yet making the difference between a defective mechanism and a practical method of accomplishing results. In such cases a decision in favor of invention as distinguished from mere mechanical improvement has not infrequently resulted, in view of the fact that the device has made the difference between an impracticable machine and a useful improvement displacing others theretofore occupying the field."

Computing v. Automatic, 204 U. S. 609; 51 L. Ed. 645; 27 S. Ct. 307.

"It is easy after the event to see how simple an act turned failure into success, but prior to the time of Shuman no mechanical skill had solved the problem, and if we may credit the testimony in this regard, those engaged in the art were diligently at work to accomplish that which only Shuman effected. He has given to the world a new, useful and valuable product. He succeeded where others failed."

Streator v. Wire Glass, 97 Fed. 950; 38 C. C. A. 573.

"* * * If the change converts failure into success something more than a matter of degree is involved."

Toledo Computing Scale Co. v. Computing Scale Co., 208 F. 410; C. C. A. 7.

See also:

Consolidated Safety Valve Co. v. Crosby Steam Gauge, 113 U. S. 157; 5 S. Ct. 513.

Commercial Success.

"The device in suit was a success from its inception, it came at once into general use, and we are satisfied is of manifest novelty and great utility. The testimony shows that it practically doubles the life of the belt. This consideration, coupled with its undoubted commercial success from the outset, would be entitled to turn the scales in favor of the validity of the patent, if it were otherwise in doubt."

Robins v. American, 145 Fed. 923; 76 C. C. A. 461.

"Has the patentee added anything of value to the sum of human knowledge, has he made the world's work easier, cheaper, safer, would the return to the prior art be a retrogression? When the court has answered this question, or these questions, in the affirmative, the effort should be to give the inventor the just reward of the contribution he has made. The effort should increase in proportion as the contribution is valuable. Where the court has to deal with a device which has achieved undisputed success and accomplishes a result never attained before, which is new, useful and in large demand, it is generally safe to conclude that the man who made it is an inventor."

O'Rourke v. McMullen, 160 Fed. 933; 88 C. C. A. 115.

"We do not say the single fact that a device has gone into general use and has displaced other devices which had previously been employed for analogous uses establishes invention. It may, however, always be considered; and when the other facts in the case leave the question in doubt, it is sufficient to turn the scale."

Smith v. Goodyear, 93 U. S. 486; 23 L. Ed. 952.

"Where an article went at once into such extensive public use as almost to supersede all others, that fact was pregnant evidence of novelty, value, and usefulness."

Magowan v. New York, 141 U. S. 332; 35 L. Ed. 781; 12 S. Ct. 62.

"While the question of patentable novelty in this device is by no means free from doubt, we are inclined in view of the extensive use to which these springs have been put by manufacturers of wagons, to resolve the doubt in favor of the patentees."

Topliff v. Topliff, 145 U. S. 156; 36 L. Ed. 658; 12 S. Ct. 825.

"The argument drawn from commercial success is not always to be relied upon. Other causes, such as the enterprise of the vendors and the lavish expenditure in advertising may promote a large demand. But when the other facts in the case leave the question of invention in doubt, the fact that the device has gone into general use and has displaced other devices which had previously been employed for analogous use, is sufficient to turn the scale in favor of the existence of invention."

Krementz v. Cottle, 148 U. S. 556; 37 L. Ed. 558; 13 S. Ct. 719.

"The fact that the device was at once successful, and that to a large extent it practically displaced all lifting-jacks in previous use, must be regarded as a circumstance of decided significance. Such circumstance clearly discloses the meritoriousness of the device. And it is well settled that when the question of patentable novelty is fairly open to doubt, the practical success of the device, with the fact that it displaced similar devices in previous use is sufficient to turn the scale in favor of the invention."

Kalamazoo v. Duff, 113 Fed. 264, 51 C. C. A. 251.

"The testimony shows that the public by large purchases appreciated Hoyt's device; and while this fact is not controlling, it is entitled to consideration, when commercial success is not shown to be due to other causes."

Dowagiac v. Minnesota, 118 F. 136, 55 C. C. A. 86.

"In view of the Moore patent and of the state of the art, the patent in suit is an extremely narrow one; but in view of the favor with which it has been received by the trade, and the long acquiescence shown, we are not prepared to hold that there was no invention in so re-organizing the fastner of the prior art as to produce for the first time a device such as that described."

Acme v. Cary, 101 F. 269, 41 C. C. A. 338.

Simplicity.

"And this is not the less true if, after the thing has been done, it appears to the ordinary mind so simple as to excite wonder that it was not thought of before. The apparent simplicity of a new device often leads an inexperienced person to think that it would have occurred to any one familiar with the subject; but the decisive answer is that with dozens and perhaps hundreds of others laboring in the same field, it had never occurred to any one before."

Potts v. Creager, 155 U. S. 597, 15 S. Ct. 194, 39 L. Ed. 275 (1895).

"The Kirk invention is undoubtedly a very simple one, and it may seem strange that a similar method of relieving the pressure had never occurred to the builders of bear-trap dams before; but the fact is that it did not, and that it was not one of those obvious improvements upon what had gone before, which would suggest itself to an ordinary workman, or fall within the definition of mere mechanical skill. It was, in fact, the application of an old device to meet a novel exigency, and to subserve a new purpose. That it is a useful improvement can scarcely be doubted."

DuBois v. Kirk, 158 U. S. 58, 15 S. Ct. 729, 39 L. Ed. 895.

"It is further argued, however, that, supposing the devices to be sufficiently described, they do not show any invention; and that the combination set forth in the fifth claim is a mere aggregation of old devices, already well known; and therefore it is not patentable. This argument would be sound if the combination claimed by Webster was an obvious one for attaining the advantages proposed,—one which would occur to any mechanic skilled in the art. But it is plain from the evidence, and from the very fact that it was not sooner adopted and used, that it did not, for years, occur in this light to even the most skillful persons. It may have been under their very eyes, they may almost be said to have stumbled over it; but they certainly failed to see it, to estimate its value, and to bring it into notice. Who *was* the first to see it, to understand its value, to give it shape and form, to bring it into notice and urge its adoption, is a question to which we shall shortly give our attention. At this point we are constrained to say that we cannot yield our assent to the argument, that the combination of the different parts or elements for attaining the object in view was so obvious as to merit no title to invention. Now that it has succeeded, it may seem very plain to any one that he could have done it as well. This is often the case with inventions of the greatest merit.

* * * * *

It may be laid down as a general rule, though perhaps not an invariable one, that if a new combination and arrangement of known elements produce a new and beneficial result, never attained before, it is evidence of invention. It was certainly a new and useful result to make a loom produce fifty yards a day when it never before had produced more than forty; and we think that the combination of elements by which this was effected, even if those elements were separately known before, was invention sufficient to form the basis of a patent.''

Loom v. Higgins, 105 U. S. 580, 26 L. Ed. 1177.

''Knowledge after the event is always easy, and problems, once solved present no difficulties, indeed may be represented as never having had any, and expert witnesses may be brought forward to show that the new thing which seemed to have eluded the search of the world was always ready at hand and easy to be seen by a merely skillful attention.''

''* * * Its simplicity should not blind us as to its character. Many things, and the patent law abounds in illustrations, seem obvious after they have been done, and, 'in the light of the accomplished result,' it is often a matter of wonder how they so long 'eluded the searcher of the discoverer and set at defiance the speculations of inventive genius.' ''

Diamond Rubber Co. of N. Y. v. Consolidated Rubber Tire Co., 220 U. S. 428, 31 S. Ct. 444, 55 L. Ed. 527 (1911).

See *Minerals Separation, Ltd. et al. v. Hyde,* 242 U. S. 261, 37 S. Ct. 82, 61 L. Ed. 286, in which the decision turned on the success achieved by using a quantity of oil much smaller than was ever heard of.

See *Edison Electric Light Co. v. U. S. Electric Lighting Co.,* 52 F. 300 (C. C. A. 2).

Change of Form.

> "Possibly an exact form of construction, possessing a distinct advantage over other forms, may be patentable."
>
> *Western v. Standard,* 84 F. 654; 28 C. C. A. 512.
>
> "The fact that this result was accomplished by a single change does not detract from its patentability."
>
> *Hutter v. DeQ. Bottle,* 128 F. 283; 62 C. C. A. 652.

Combining References.

> "Even if it be conceded that the individual elements composing the combination are to be found in the prior art, yet to make the selection of these parts from the prior art, and combine them so as to produce a clutch, which is at the same time simple, compact, effective and useful, required more than ordinary mechanical skill."
>
> Fairbanks v. Stickney, 123 F. 79; 59 C. C. A. 209.

Change in Angular Direction.

> "The 7th Section of the Act of March 3, 1839 (5 Stat. at Large, 354) is not limited to patents for machines, manufactures, and compositions of matter; it embraces an invention of a new improvement in the art of casting iron, by giving an angular direction to the tube which conducts the metal to the mould."
>
> *McClurg v. Kingsland,* 1 How. 202, 11 L. Ed. 102.

Reconciliation of Antagonisms.

"This was a problem of reconciliation of antagonisms, which so often occur in mechanics and without which practically successful results are not attained."

Consolidated v. Crosby, 113 U. S. 157; 28 L. Ed. 939; 5 S. Ct. 513.

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Joseph W. [illegible]

No. 7750

In the United States Court of Appeals for the District of Columbia

RICHARD L. CAWOOD, APPELLANT

v.

CONWAY P. COE, COMMISSIONER OF PATENTS, APPELLEE

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA

BRIEF FOR THE COMMISSIONER OF PATENTS

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No. 7750

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APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA

BRIEF FOR THE COMMISSIONER OF PATENTS

INTRODUCTION

This is an appeal from a judgment of the District Court of the United States for the District of Columbia (R. p. 14) in an action brought by appellant under Section 4915, R. S. (U. S. C., title 35, sec. 63), to authorize the Commissioner of Patents to issue to appellant a patent on his application Serial No. 67,353 for Ball Mills.

APPELLANT'S DEVICE

Appellant's application (record, page 42) relates to ball mills. The device as disclosed by appellant in his application consists of a steel drum having spaced around its inner periphery ribs or bulbous sections which serve to lift the balls thereby causing cataracting or cascading thereof and preventing the balls from wearing grooves on the inner surface of the drum. These ribs are curved in cross section as illustrated in appellant's drawing (record, page 47) to present a smooth surface to the action of the balls. Sharp corners are eliminated, which the balls might abrade thereby causing contamination of the material in the mill.

Appellant in his brief refers to his device as though its sole and only purpose was for the dispersion of paint and ink products. It must be noted, however, that the claims in issue are not so limited but are broadly drawn to a ball mill which may be used for any purpose for which it is adapted. Indeed, the testimony of Cawood indicates that one of the uses to which his mill has been put is the grinding of rouge (record, page 29). Likewise it must be noted that the mere use of a steel ball mill for the purpose of paint dispersion is not original with appellant. The letters at record, pages 57, 67, and 70, and the testimony of Harden (record, page 32) indicate that the old commercial type of steel ball mills with the square lifter bars had previously been used in the paint industry for the same purposes. It further appears that appellant in discussing the operation of his device has placed undue emphasis on the term "dispersion" as used in contradistinction to the term "grinding." The various witnesses called by appellant throughout their testimony refer to the action of the balls in the mill as a "grinding" action, and it is to be noted that in the Cawood specification, as originally filed, the term "grinding" was used to the exclusion of the term "dispersing" and it was not until April 1937, by the amendment appearing at page 50 of the record, that the term "dispersing" was inserted in place of the term "grinding."

THE EVERITT & CO. PATENT

The British patent to Everitt & Co., No. 105,614 (record, pages 81 to 84), discloses a ball mill wherein a steel drum 1 has cast integral therewith on its inner surface ribs or bulbous sections 17. These ribs are curved in cross section and are joined to the surface of the drum by fillets or reversed curves so that no sharp abutments are presented to the action of the balls during the operation of the mill.

THE JENSEN PATENT

The patent to Jensen, No. 1,291,008 (record, page 77), discloses a ball mill having a drum 11 with lining plates 14 attached to the inner surface thereof. As shown in Fig. 1 of this patent, these lining plates are waved in cross section presenting smooth curved bulbous sections to the action of the balls in the mill. These curved sections are joined to the surface of the drum by long flat reversed curves and lack any sharp abutments which might be abraded by the action of the balls in the mill.

SUMMARY OF ARGUMENT

1. The claims on appeal define nothing involving invention over the British patent to Everitt & Co.

2. The claims on appeal define nothing involving invention over the Jensen patent.

3. The claims on appeal define nothing involving invention over the patent to Jensen when considered with the teaching of the patent to Everitt & Co.

4. The testimony adduced by appellant relative to commercial success fails to establish the patentability of the claims on appeal.

a. Whatever commercial success is shown by the testimony adduced by appellant is due to factors other than those involved in the claims in issue.

b. The testimony adduced relative to commercial success and utility relates to the advance over prior commercial devices and not to any utility or advance over the prior art as exemplified by the patents to Jensen and Everitt & Co. cited in this action.

ARGUMENT

Claims on appeal unpatentable over patent to Everitt

Claims 4, 8, 9, and 10 are to be found in the record on pages 3 and 4.

These claims recite a ball mill including a shell having streamline enlargements formed integral with the shell wall, the enlargements being in a continuous more or less compound curve the sides of which gradually and approximately uniformly slope and curve into the walls of the shell whereby in the action of the ball mill when operated, the balls are allowed to roll smoothly up one side and down the other of the enlargements.

The patent to Everitt & Co. discloses a ball mill having ribs integral with the shell, the ribs being curved in cross section and joined to the inner surface of the shell by a reverse curve or fillet. When the showings of both the Everitt & Co. patent and appellant's device are compared it appears that appellant's ribs are only slightly more curved than those of the Everitt & Co. patent and no patentable distinction appears to reside in this small change. It is believed that the enlargements of the Everitt & Co. patent may be said to have sides gradually and approximately sloping, merging into the walls of the shell as called for in the claims on appeal and that therefore the claims on appeal are fully met by the Everitt & Co. disclosure when considered alone.

Claims on appeal unpatentable over Jensen patent

The Jensen patent, particularly in Fig. 1 thereof, discloses a ball mill having a liner 14 comprised of sections waved in cross section. The curved enlargements of Jensen are joined to the inner wall of the shell by even longer and flatter reversed curves than in appellant's device and it is believed that no invention would be involved in making the liner of Jensen integral with the shell of the mill. It is well established by a long line of decisions that the mere making of parts integral rather than riveting, welding, or otherwise fastening them together does not constitute invention. *Enterprise Railway Equipment Co.* v. *Pullman Standard Car Manufacturing Co.*, 95 F. (2d) 17 (7th Cir.); *Kirsch Manufacturing Co.* v. *Gould Mersereau Co.*, 6 F (2d) 793 (2nd Cir.); *In re Bush*, 46 App. D. C. 141; *Howard* v. *Detroit Stove Works*, 150 U. S. 164.

The testimony adduced by appellant is very meager with relation to its discussion of the Jensen patent. The only mention of the Jensen patent in appellant's testimony may be found in the last three lines of the record, page 23, record, page 24, and a few lines in the middle of the record, page 25. All that is here stated with regard to the Jensen patent is that its use would not be feasible in the grinding of paint since, as it has a separate liner, paint from one batch might leak down in the cracks of the liner forming pools between the liner and shell and when the mill was charged with the second batch would again leak out contaminating the second batch and destroying its value. It is admitted that such might occur in the use of the Jensen mill, but it is believed that the remedy for this disadvantage is equally obvious to one skilled in the art, namely, the making or casting of the lining and shell as one piece. No invention resides in thus making these parts integral as previously pointed out.

The rest of the testimony relative to the Jensen patent appears to be confined to Fig. 5, and a discussion of the abrading action that would occur due to the use of the bars 29. However, it must be noted that Fig. 1 does not employ these bars and presents a smooth surface to the action of the balls and does not have the disadvantage of abrasive action as testified to relative to Fig. 5. Appellant's only mention of Fig. 1 appears in the record, page 24, in response to a question by the court relative to a comparison between Fig. 5 and Fig. 1. The witness Cawood merely answered that in Fig. 1 the lining was bolted directly to the shell and that the two figures were but two methods of applying the same general type of lining. It is believed this testimony ignores the fundamental question in issue by attempting to confine attention to Fig. 5 of the Jensen patent to the exclusion of Fig. 1. It has not been contended that the form of Fig. 5 constitutes an anticipation of the claims on appeal. The form of the device as disclosed in Fig. 1 of Jensen is the form wherein the enlargements on the inner periphery of the mill are curved in cross section and joined to the mill by long reversed curves which present a smooth surface to the action of the balls when the mill is in operation and which perform the same function as appellant's enlargements in the same manner to produce the same result. Appellant has failed to produce any testimony relative to any distinction between the claims on appeal and the device as disclosed in Fig. 1 of the Jensen patent and it is not believed that he has established by any proof the patentability of the claims over this disclosure.

Appellant in his brief attempts to distinguish between the operation of the Jensen device and appellant's device by stating that Jensen was looking towards a maximum agitation of the mill contents whereas appellant's idea is not an agitation but a gradual flowing movement with the resultant dispersion of the material. However, a careful comparison between the Jensen disclosure and the disclosure of appellant's device and the testimony of record fails to indicate any difference in the idea or operation of the two devices.

Cawood in describing the development of his device indicates that his idea was to get away from the smooth mill which caused wear of the mill and the balls by the balls sliding down the smooth surface of the mill. He states at record, page 21:

> I then developed a mill so that the shell and the heads were all one piece. The great difficulty with this was that the balls slid down this smooth surface, and the balls wore flat. Also, they naturally drifted into a race or circuit around the mill, following the same path of travel, thus grooving the shell.
>
> In order to get rid of that, we put into the mill lifter bars. That is, lifter bars were first bolted in and were later welded in. But I found that the abrading action of those balls against the bars eroded the bars and also caused considerable wear on the balls with the metallic contamination entering the product.

The Jensen patent at record, page 79, develops the same idea as follows:

> It has become well known in the art to which my invention relates that the grinding action is due to the local motion and agitation of the grinding balls or cylpebs. This local movement of the balls or cylpebs causes the contents of the mill to be ground therebetween. Any sliding action of the contents of the mill with reference to the lining plates or the mill shell, causes excessive wear upon the lining plates, and prevents the local agitation and movement of the balls and cylpebs one with relation to the other, so that sliding

> in the grinding mill takes place at the expense of the lining plates and prevents the proper grinding of the mill contents. In order to overcome this sliding of the mill contents, it has heretofore been customary to form the lining plates of various shapes and forms and to provide bars or ribs extending longitudinally of the mill. The lining plates were of a haphazard configuration some being provided with steps, others with sharply slanted peaked sides, while others were of a waved configuration. Such haphazard configuration did not, however as will be hereinafter more apparent, produce the maximum local movement of the balls or cylpebs and consequently the maximum grinding action was not obtained.

It appears from a comparison of these quotations that Jensen and appellant discovered the same disadvantages in prior commercial structures and overcame them in the same manner. Cawood states (record, page 21):

> In order to maintain good cataracting and lengthwise movement of the balls in the mill, I developed the streamline bulbous sections which are now an integral part of the shell, streamlining the bulbous sections as well as the shell of the mill into the heads, so that there were no sharp corners, no crevices left; so that all lines flowed smoothly into the others.
>
> Thus, as the balls rotate and move freely in the mill, they rub smoothly against each other and against the mill proper, thus eliminating any cause of contamination.

In his specification Cawood speaks of the same action in the following words (record, page 43):

> This invention consists of an improved ball mill, the inner wall of which is provided with streamlined enlargements located around the inner periphery at predetermined intervals and extending throughout the length of the mill, the entire body inside being polished, for the purpose of raising the balls to the proper height

> and cascading them without creating the erosion resulting from the hammering and grinding action of the balls against the sharp edges of the lifter bars as heretofore,

and again:

> These enlargements 2 act as lifters just as the well known angular bars did, that is to say they lift the balls 3 as the mill rotates. Without some lifting means, great slippage would occur, and it would be practically impossible to raise the balls to the proper height for cascading to produce economical grinding of the material being treated in the mill.

Jensen develops the same thought at page 80 of the record as follows:

> As the mill is rotated, the ingredients thereof partake of the motion similar to the motion of the generating circle, by which the curvature of the lining plates was constructed, and this local agitation and forward movement, as well as the local rotation of each of the cylpebs or balls, causes the contents of the mill to be efficiently ground, the entire action taking place without sliding, and therefore with a minimum amount of wear upon the lining plates. In order to cause the ingredients to break over, similar to the surf of the ocean waves, and in order to break up any particular formation within the mill, the adjacent trochoidal arcs, or more specifically the adjacent hypotrochoidal arcs, are formed from different generating circles.

A comparison of these statements of Jensen and appellant appears to indicate that both were interested in the same type of action, namely, a rolling of the balls on the mill lining rather than a sliding movement. Appellant has seized upon a simile used by Jensen of "breaking over similar to the surf of the ocean waves" to support his thesis that the Jensen device produces an agitation not present in appellant's mill. However, it is believed that the term "breaking over similar to the surf of the ocean waves" is as apt and is similar in meaning to the terms "cataracting" and "cascading" as used by appellant. Likewise it appears to be as apt a simile as that used by appellant in describing the action of his device as similar to skiers gliding over a rise in the ground. It therefore appears from a comparison of Jensen's disclosure and appellant's disclosure that both were interested in overcoming the same difficulties which they did in the same way and with the same results.

Claims on appeal unpatentable over Jensen in view of Everitt

While it is believed that no invention would be involved in making the lining of the Jensen patent integral with the shell even if nothing more was shown, it is submitted that certainly no invention resides in making the lining integral when the teaching of the patent to Everitt & Co. is considered. Everitt & Co. has its enlargements case integral with the steel drum, and it is submitted that one skilled in the art having this teaching before him when considering the obvious disadvantage of the Jensen device in allowing leakage between the lining and drum and thus contamination, would overcome this disadvantage in the same manner as has appellant; that is, by following the teaching of the Everitt & Co. disclosure and making the lining of the Jensen device integral with the drum.

Alleged commercial success

The major portion of the testimony adduced by appellant relates to commercial success. It is submitted, however, that mere commercial success in and of itself does not constitute a reason for holding a device patentable. It is believed that there is no doubt that appellant's device is unpatentable over the references discussed herein and while commercial success is sometimes used to tip the balance towards patentability in cases of doubt, it cannot both create doubt and dissolve it. *John Riddell, Inc.* v. *Athletic Shoe Co.*, 75 F. (2d) 93 (2nd Cir.); *In re Myers*, 104 F. (2d) 391, C. C. P. A.; *Pick et al.* v. *Coe*, 69 App. D. C. 216.

Furthermore, it is believed that what commercial success has been had by appellant's device as adduced by the testimony is due more to the material of which the drum is composed rather than the construction of the enlargements as set forth in the claims on appeal. Appellant has introduced correspondence (R. 55–75, inc.) from various companies who purchased and used his mills and it is to be noted that in these nineteen letters all but two emphasize the fact that the ball mill is made of chrome manganese steel, a very hard material which would be expected to show very little abrasion. On the other hand, only one of these nineteen letters mentions the ribs at all. Likewise it is admitted in the testimony (record, page 34) that a goodly portion of the utility of the mill is due to the fact that it is made of hard material. It therefore appears that commercial success, particularly in the instant case, is a very unsafe criterion as to patentability since other facts such as the material of which the mill is constructed and, as always, the advertising and selling power of the company, are involved.

Appellant in his brief, page 27, in an effort to minimize the fact of the use of the abrasion resistance of chrome manganese steel states that Cawood undoubtedly tested all available material to determine what would give the best and most enduring results in experiments extending over a period of ten years, thereby inferring that the hard material was used and found not to give the final results until the shape of the lifter bars was changed. It is believed that such inferences are wholly unwarranted. There is absolutely no testimony adduced to indicate that Cawood made any tests on different materials. As a matter of fact, Cawood's testimony if anything seems to indicate that the last change made in the ball mills as sold commercially by appellant was the change to hard material and not in the change in the shape of the lifter bar. Cawood states at record, page 30, that of the mills referred to in the letters introduced to indicate commercial success of the device and therefore presumably of the structures of the issue herein, only the ones of later manufacture were of wear-resisting chrome manganese steel. To the same effect is the testimony of Harden (record, page 32) wherein he describes the history of the development of the device and wherein he indicates that the last development was of the hard chrome manganese shell and balls. The record would therefore seem to indicate that the final step taken and the one which led to the commercial success adduced by the testimony was in the use of the hard material, a feature which is not found in the limitations of the claims in issue.

It must be also noted that the testimony concerning the utility and commercial success of the mill almost wholly relates to its utility over the devices that were previously used commercially and not to any device as exemplified by the Everitt & Co. and Jensen patents cited herein. As pointed out by Harnden (record, pages 31 and 32) the art advanced from Buhrstone mills and pebble mills which were lined with silex blocks and other ceramics, through steel-ball mills wherein the drum was composed of soft material and had not lifter bars or ribs, to mills wherein square lifter bars were welded or bolted on the inner surface thereof, to the so far final stage of appellant's ball mill wherein curved lifter ribs are cast integral in a chrome-manganese-steel mill. The only testimony which approaches a comparison of mills as exemplified by the patents to Everitt & Co. and Jensen is that of Eichelberger, who states that he compared a soft-steel mill and a hard-steel mill having bars welded thereon with the mill as exemplified by appellant's disclosure. He states that the bars of the hard-steel mill (record, page 38) compare favorably with the showing of the Everitt & Co. patent. He admits, however, that these bars were not rounded as much as those of the Everitt & Co. disclosure and his testimony leaves some doubt as to how rounded in fact these bars were made. In his direct examination he stated that the above-discussed comparison was made by replacing a soft-shell mill with a hard-chrome-manganese shell and in this shell the hard-square-lifter-type bar was welded. In cross-examination (record, page 37) he states that the corners were not sharp, since the welding made them curved, that it was not sharp though it was not a complete curve. In redirect examination he stated (R. 38) that the bars compared favorably in cross section to those of the Everitt & Co. patent and then in recross-examination (R. 83) stated that the bars were made rounded by both the welding of the edge to the shell and a welding over the two outside edges. It appears from this testimony that when the question was merely comparison of a hard-steel shell the bars were stated as the square lifter type but after the Everitt & Co. patent was brought into the question and shown to the witness, the square bars became more and more rounded although even here they never did become as rounded as those of the Everitt & Co. patent. While it may be true that the mill as disclosed by appellant's application may have utility over what was formerly used by the art, it does not appear that the same advantages would be present over the mills as disclosed by Everitt & Co. and Jensen. In this respect it must be noted that while appellant conducted a demonstration and attempted to show a difference in action between his device and that of the Everitt & Co. patent, he made not attempt to distinguish or demonstrate any difference in action between his device and that of the Jensen patent and it is believed that none could be shown.

CONCLUSION

In conclusion, it is submitted that none of the claims on appeal recite anything involving invention over what is disclosed in the patents cited against them and that the rulings of the lower court should be affirmed.

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